



**US Army Corps
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Waterways Experiment
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October 1993

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Ship Navigation Simulation Study, Lorain Harbor, Lorain, Ohio

Volume II: Appendices A and B

*by Michelle M. Thevenot, Carl J. Huval, Larry L. Daggett
Hydraulics Laboratory*

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by Michelle M. Thevenot, Carl J. Huval, Larry L. Daggett
Hydraulics Laboratory

U.S. Army Corps of Engineers
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

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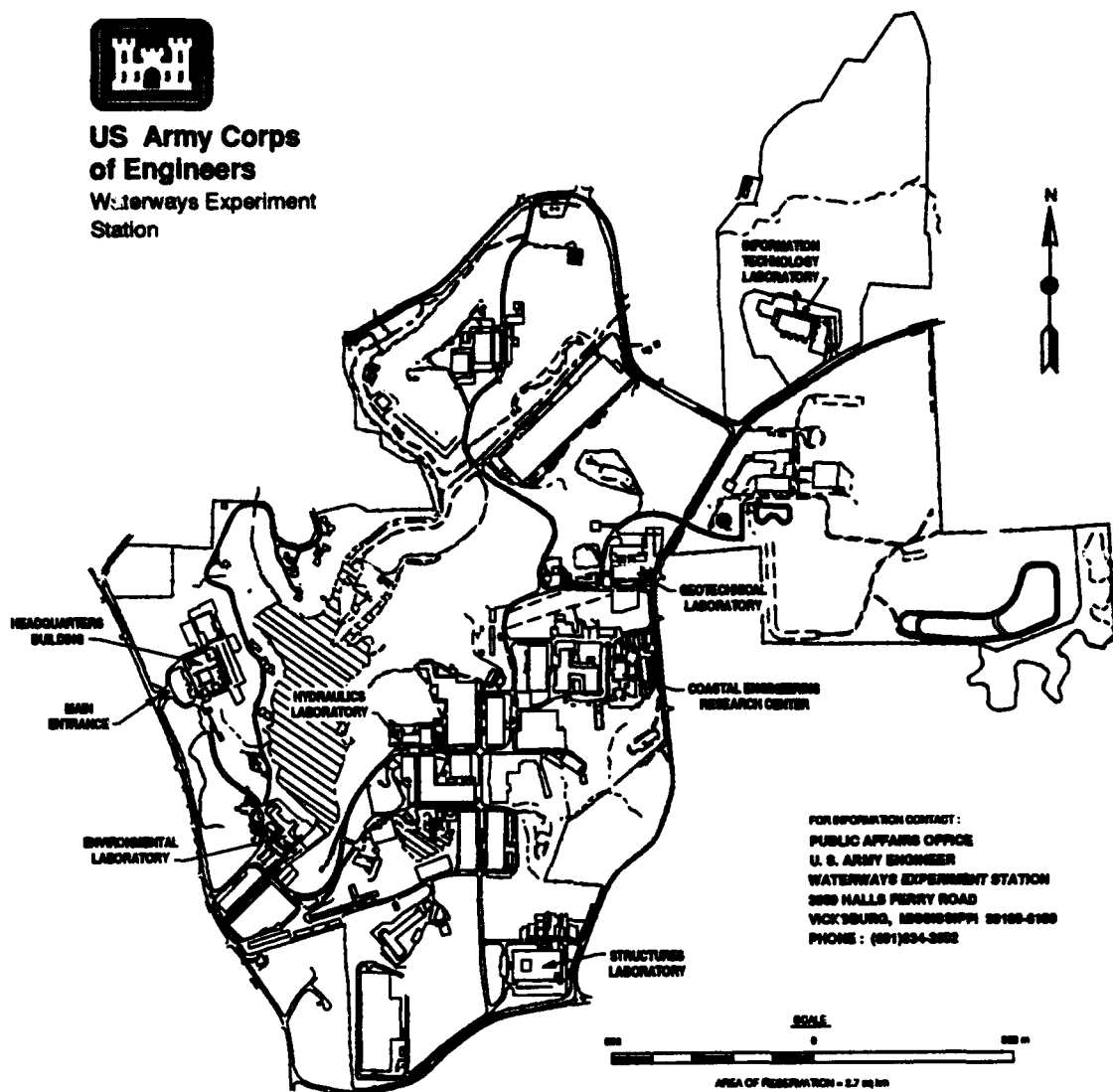
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APPENDIX A: SHIPMASTER QUESTIONNAIRE AND COMMENTS

**LORAIN HARBOR SHIP SIMULATION PROJECT
PILOT RATING**

PILOT: _____
 RUN CODE: _____
 START TIME: _____

DATE: _____
 FILE NAME: _____
 END TIME: _____

Have you ever piloted a vessel with a stern thruster? _____

The purpose of this questionnaire is to document your evaluation of the simulator run you have just completed. Please rate the run relative to your overall experience in handling ships in this reach. Feel free to make any specific comments you believe will be helpful in interpreting your ratings. You may wish to make notes on the trackline plot presented to you following the run.

	Very Simple										Very difficult	
	0	1	2	3	4	5	6	7	8	9	10	
Area A	0	1	2	3	4	5	6	7	8	9	10	
Area B	0	1	2	3	4	5	6	7	8	9	10	
Area C	0	1	2	3	4	5	6	7	8	9	10	
Area D	0	1	2	3	4	5	6	7	8	9	10	
Area 1	0	1	2	3	4	5	6	7	8	9	10	
Area 2	0	1	2	3	4	5	6	7	8	9	10	

DIFFICULTY OF THE RUN

	Little										All of it	
	0	1	2	3	4	5	6	7	8	9	10	
Area A	0	1	2	3	4	5	6	7	8	9	10	
Area B	0	1	2	3	4	5	6	7	8	9	10	
Area C	0	1	2	3	4	5	6	7	8	9	10	
Area D	0	1	2	3	4	5	6	7	8	9	10	
Area 1	0	1	2	3	4	5	6	7	8	9	10	
Area 2	0	1	2	3	4	5	6	7	8	9	10	

MANEUVERABILITY

	Little										Tremendous	
	0	1	2	3	4	5	6	7	8	9	10	
Area A	0	1	2	3	4	5	6	7	8	9	10	
Area B	0	1	2	3	4	5	6	7	8	9	10	
Area C	0	1	2	3	4	5	6	7	8	9	10	
Area D	0	1	2	3	4	5	6	7	8	9	10	
Area 1	0	1	2	3	4	5	6	7	8	9	10	
Area 2	0	1	2	3	4	5	6	7	8	9	10	

DANGER OF GROUNDING

	Little										Tremendous	
	0	1	2	3	4	5	6	7	8	9	10	
Area A	0	1	2	3	4	5	6	7	8	9	10	
Area B	0	1	2	3	4	5	6	7	8	9	10	
Area C	0	1	2	3	4	5	6	7	8	9	10	
Area D	0	1	2	3	4	5	6	7	8	9	10	
Area 1	0	1	2	3	4	5	6	7	8	9	10	
Area 2	0	1	2	3	4	5	6	7	8	9	10	

AMOUNT OF BANK EFFECTS

	Bad										Very good	
	0	1	2	3	4	5	6	7	8	9	10	
Area A	0	1	2	3	4	5	6	7	8	9	10	
Area B	0	1	2	3	4	5	6	7	8	9	10	
Area C	0	1	2	3	4	5	6	7	8	9	10	
Area D	0	1	2	3	4	5	6	7	8	9	10	
Area 1	0	1	2	3	4	5	6	7	8	9	10	
Area 2	0	1	2	3	4	5	6	7	8	9	10	

AMOUNT OF THRUSTER USED

LORAIN HARBOR SHIP SIMULATION STUDY

The purpose of this questionnaire is to get your final thoughts on the simulation study in which you have just participated. Please base your answers on the simulation runs.

1. Do you feel that the way in which the thrusters were used would damage the vessels docked along the banks or cause extensive erosion?
2. On the channel provided, show the cuts you would implement assuming a stern thruster is added to the ship. Prioritize them by numbering from most important through least important.
3. Have the bank effects changed? If so, show where (on the channel provided). State whether they were helpful or hindering.
4. The simulator provides (circle one):
 - a) less information than
 - b) the same information
 - c) more information thanavailable aboard the ship.
5. On a scale from 0 to 10 (10 being excellent), what is your overall opinion of the simulator and the Lorain Harbor simulation.
6. Do you have any suggestions for improving the simulation?
7. Please use the space provided for any additional comments.

LORAIN HARBOR SHIP SIMULATION STUDY

The purpose of this questionnaire is to get your final thoughts on the simulation study in which you have just participated. Please base your answers on the simulation runs.

1. Do you feel that the way in which the thrusters were used would damage the vessels docked along the banks or cause extensive erosion?

Little damage to other vessels (possibly hazard for small craft). Could create some erosion as all thrusters will.

2. On the channel provided, show the cuts you would implement assuming a stern thruster is added to the ship. Prioritize them by numbering from most important through least important.

Done.

3. Have the bank effects changed? If so, show where (on the channel provided). State whether they were helpful or hindering.

No effects noticed.

4. The simulator provides (circle one):

- a) less information than
 - b) the same information
 - c) more information than
- available aboard the ship.

5. On a scale from 0 to 10 (10 being excellent), what is your overall opinion of the simulator and the Lorain Harbor simulation.

8

6. Do you have any suggestions for improving the simulation?

Longer period of time for Pilot to familiarizes himself @ characteristics of equipment.

7. Please use the space provided for any additional comments.

**LORAIN HARBOR SHIP SIMULATION STUDY
PILOT RATING**

PILOT: _____
 RUN CODE: _____
 START TIME: _____

DATE: _____
 FILE NAME: _____
 END TIME: _____

The purpose of this questionnaire is to document is to your evaluation of the simulation run just completed. Please rate the run relative to your overall experience in handling ships in this reach. Feel free to make any specific comments you believe will be helpful in interpreting your ratings. You may wish to make notes on the trackline plot presented to you following the run.

Rate the difficulty of the run?

very simple											very difficult
0	1	2	3	4	5	6	7	8	9	10	

What was the likelihood of grounding?

none											often
0	1	2	3	4	5	6	7	8	9	10	

Rate the controllability of the ship in the following areas?

1. Area B

very easy											very difficult
0	1	2	3	4	5	6	7	8	9	10	

2. Area C

very easy											very difficult
0	1	2	3	4	5	6	7	8	9	10	

3. Area D

very easy											very difficult
0	1	2	3	4	5	6	7	8	9	10	

4. Turning Basin

very
easy

very
difficult

0 1 2 3 4 5 6 7 8 9 10

Rate the damage you feel would have been caused to docked ships due to the wake of the ship or the thruster jets.

no
damage

unacceptable
amounts of
damage

0 1 2 3 4 5 6 7 8 9 10

How accurate were the simulated bank effects.

very
unrealistic

very
realistic

0 1 2 3 4 5 6 7 8 9 10

How accurate was the behavior of the ship.

very
inaccurate

very
accurate

0 1 2 3 4 5 6 7 8 9 10

Please feel free to make comments concerning the simulator run you have just completed.

**LORAIN HARBOR SHIP SIMULATION STUDY
FINAL QUESTIONNAIRE**

The purpose of this questionnaire is to document your final thoughts on the proposed bank cuts to the Black River in Lorain, Ohio.

With the consideration that initial and maintenance dredging costs are major factors in project viability, what channel cuts would you recommend in the following areas? Please specify the size. Also, give the priority of the cut in each area.

1. Area B
2. Area C
3. Area D
4. Turning Basin
5. Do you feel that the way in which the thrusters were used would cause extensive bank erosion? Specify where.
6. Do you have any suggestions for improving the simulator procedure in general?
7. Overall how do you rate the realism of the simulator?

LORAIN HARBOR SHIP SIMULATION STUDY
FINAL QUESTIONNAIRE

The purpose of this questionnaire is to document your final thoughts on the proposed bank cuts to the Black River in Lorain, Ohio.

With the consideration that initial and maintenance dredging costs are major factors in project viability, what channel cuts would you recommend in the following areas? Please specify the size. Also, give the priority of the cut in each area.

1. Area B

The proposed cut in Area "B" in Plan #1 would be helpful, need not be large as Plan #2 - Priority #3.

2. Area C

The propose cut in Area C would be most helpful. The cut in Plan #1 would be all that is needed. Need not Plan #2.

3. Area D

The cut in Plan 2 would be of some help. Not a high Priority Area.

4. Turning Basin

The propose cut at the turn basin would be very helpful Plan #1
Priority #2 - need not go to Plan 2.

Priority #4 would be the corner area across from the old ship yard dry docks near Erie Ave.

5. Do you feel that the way in which the thrusters were used would cause extensive bank erosion? Specify where.

No.

6. Do you have any suggestions for improving the simulator procedure in general?

The speed for the RPM in the River, with the hard turns, may be a little fast.

7. Overall how do you rate the realism of the simulator?

Good.

**LORAIN HARBOR SHIP SIMULATION STUDY
FINAL QUESTIONNAIRE**

The purpose of this questionnaire is to document your final thoughts on the proposed bank cuts to the Black River in Lorain, Ohio.

With the consideration that initial and maintenance dredging costs are major factors in project viability, what channel cuts would you recommend in the following areas? Please specify the size. Also, give the priority of the cut in each area.

1. Area B

Cut 80 ft

2. Area C

Cut 150 ft

3. Area D

Cut 50 ft

4. Turning Basin

Cut 150 ft

5. Do you feel that the way in which the thrusters were used would cause extensive bank erosion? Specify where.

Yes Area B and A and Turning Basin

6. Do you have any suggestions for improving the simulator procedure in general?

No.

7. Overall how do you rate the realism of the simulator?

Very accurate.

**LORAIN HARBOR SHIP SIMULATION STUDY
FINAL QUESTIONNAIRE**

The purpose of this questionnaire is to document your final thoughts on the proposed bank cuts to the Black River in Lorain, Ohio.

With the consideration that initial and maintenance dredging costs are major factors in project viability, what channel cuts would you recommend in the following areas? Please specify the size. Also, give the priority of the cut in each area.

1. Area B

Cut between 1 + 2 proposal.

2. Area C

Cut between 1 + 2 proposal.
Most important.

3. Area D

50 ft.

4. Turning Basin

Take corner off.

5. Do you feel that the way in which the thrusters were used would cause extensive bank erosion? Specify where.

No.

6. Do you have any suggestions for improving the simulator procedure in general?

No.

7. Overall how do you rate the realism of the simulator?

Very good.

LORAIN HARBOR SHIP SIMULATION STUDY
FINAL QUESTIONNAIRE

The purpose of this questionnaire is to document your final thoughts on the proposed bank cuts to the Black River in Lorain, Ohio.

With the consideration that initial and maintenance dredging costs are major factors in project viability, what channel cuts would you recommend in the following areas? Please specify the size. Also, give the priority of the cut in each area.

1. Area B

WNW corner removal of western bank would aid in vessels not required to use thrusters in marina area.

Priority #3

2. Area C

This would be a priority #1 of all the areas. Cut as much as the last run (FDW 242) Re: When vessel, single screw, backing does not help make the turn.

3. Area D

Removal of west corner would aid in turn if vessels are using the south dock

Priority #4

4. Turning Basin

Remove corner, north pt, also widen and deepen notch.

RE: vessel turning in wind and current would be able to handle the conditions easier.

Priority #2 (also relieves the master on room for the stern to swing.)

5. Do you feel that the way in which the thrusters were used would cause extensive bank erosion? Specify where.

Yes, in any area that is not lined with rip-rap-providing the turns are left as is. If all turns are widened thruster wash should not do too much damage. There is not that much damage in Rouge River.

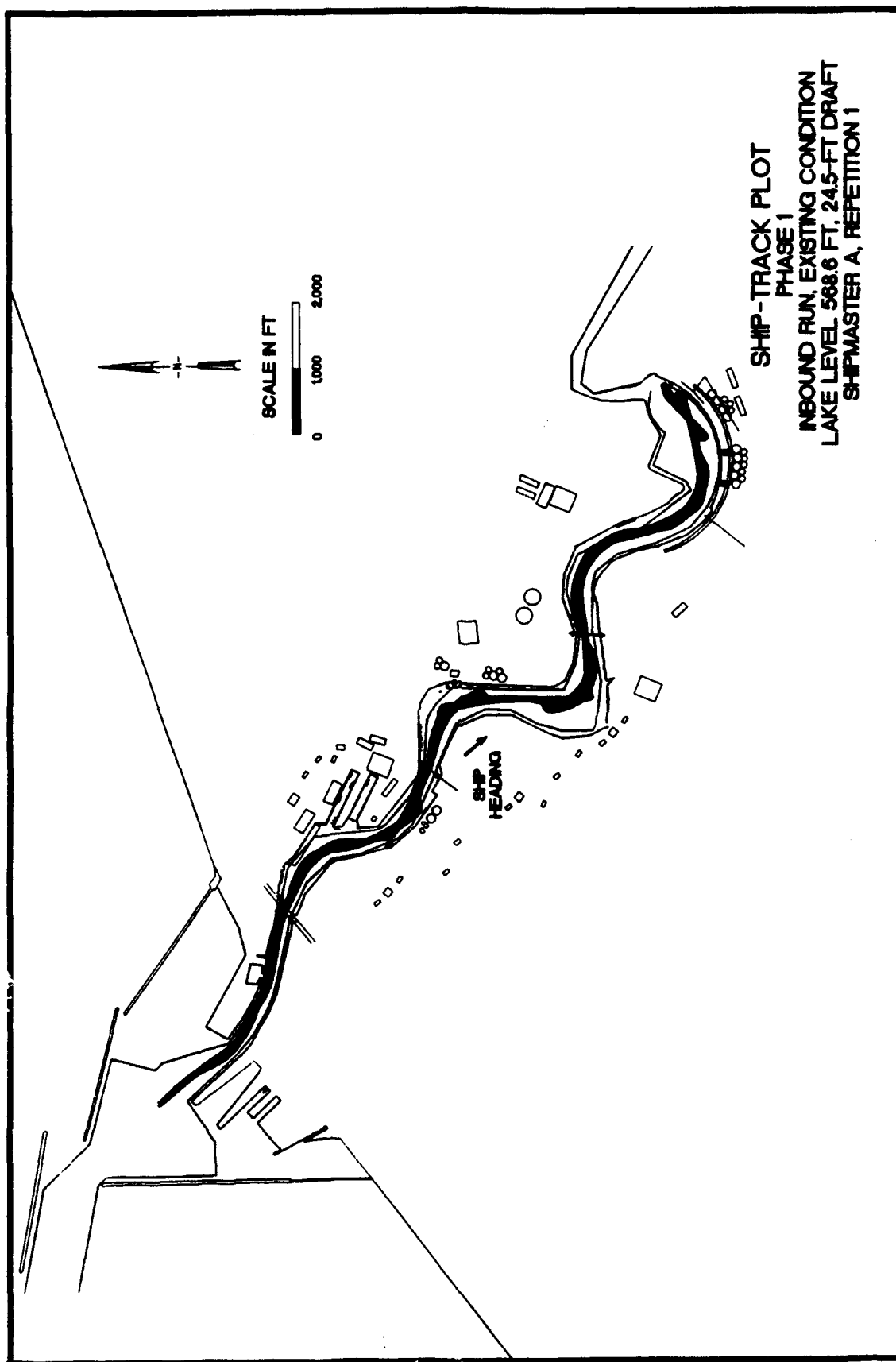
6. Do you have any suggestions for improving the simulator procedure in general?

None, as is, the system is very realistic to handling a vessel.

7. Overall how do you rate the realism of the simulator?

Very good.

APPENDIX B: SHIP TRACK PLOTS



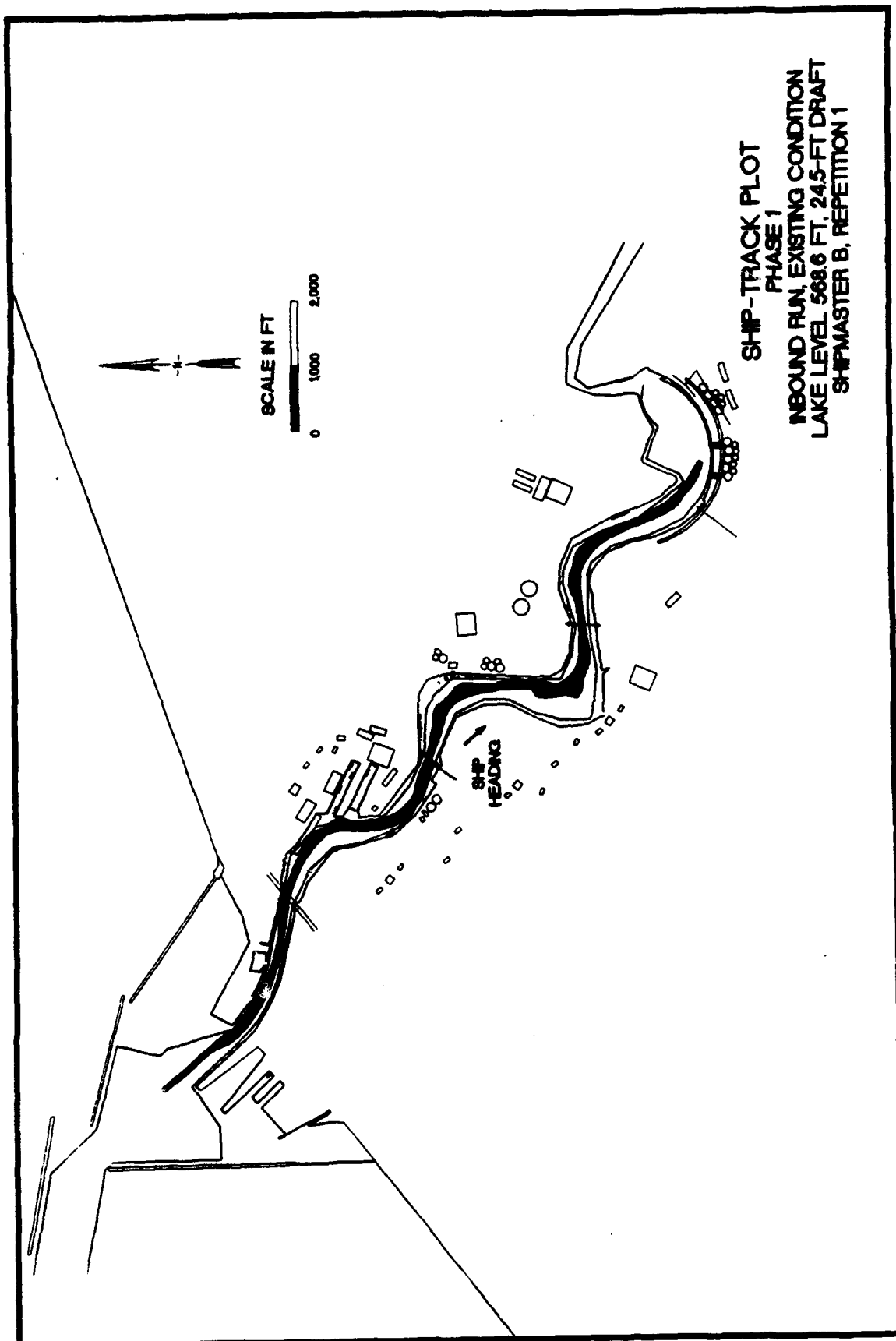
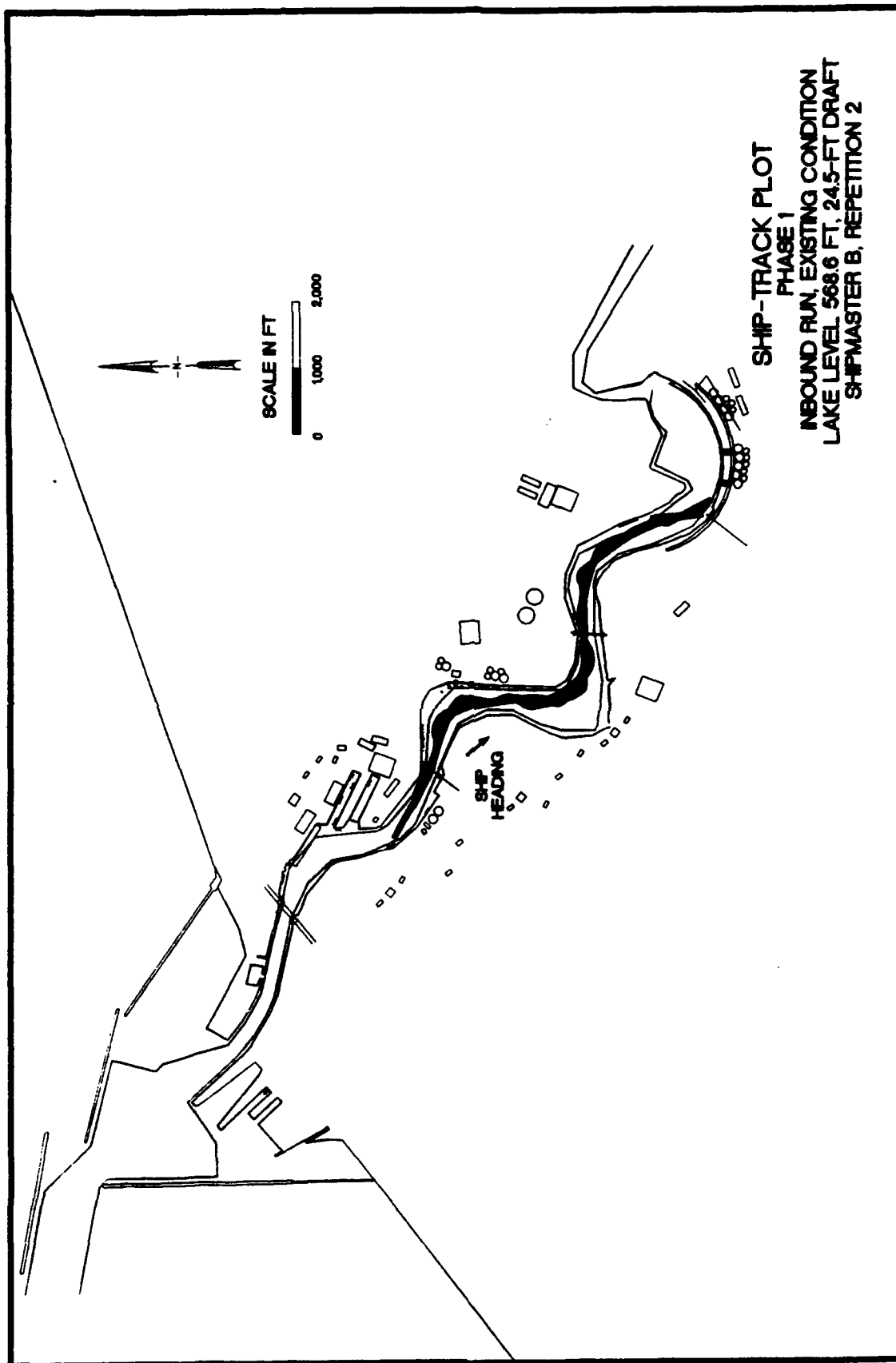


PLATE B2



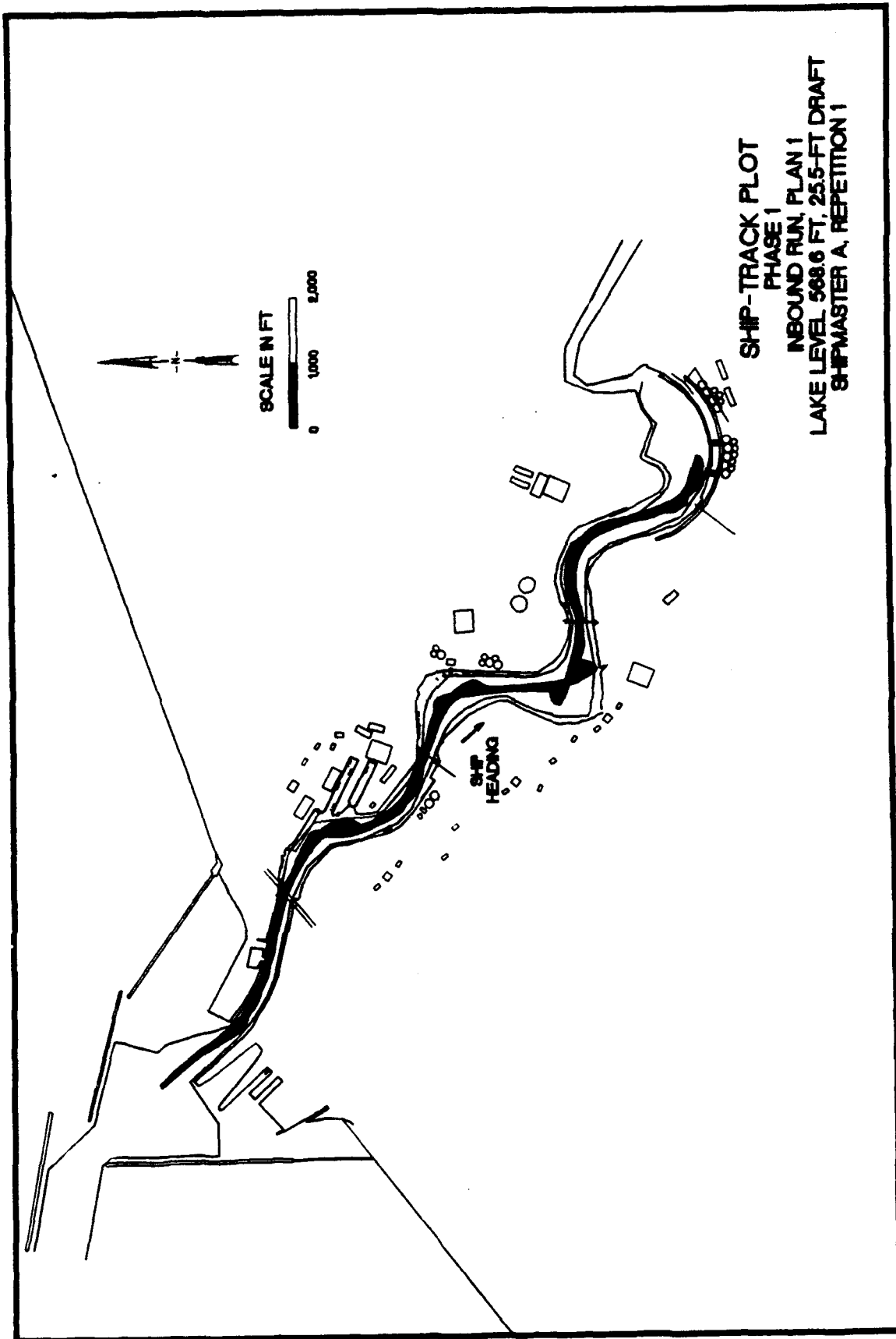
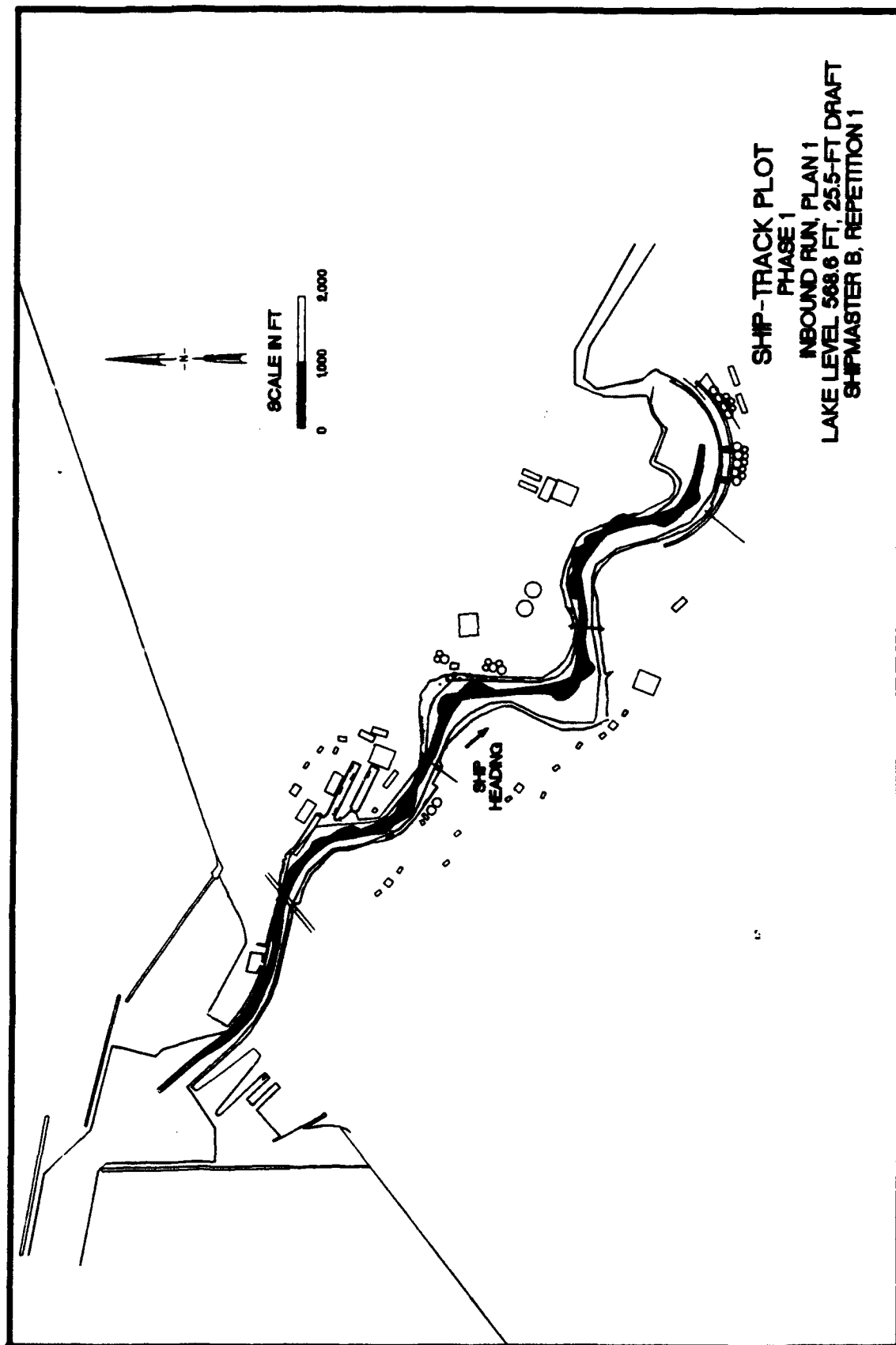


PLATE B4



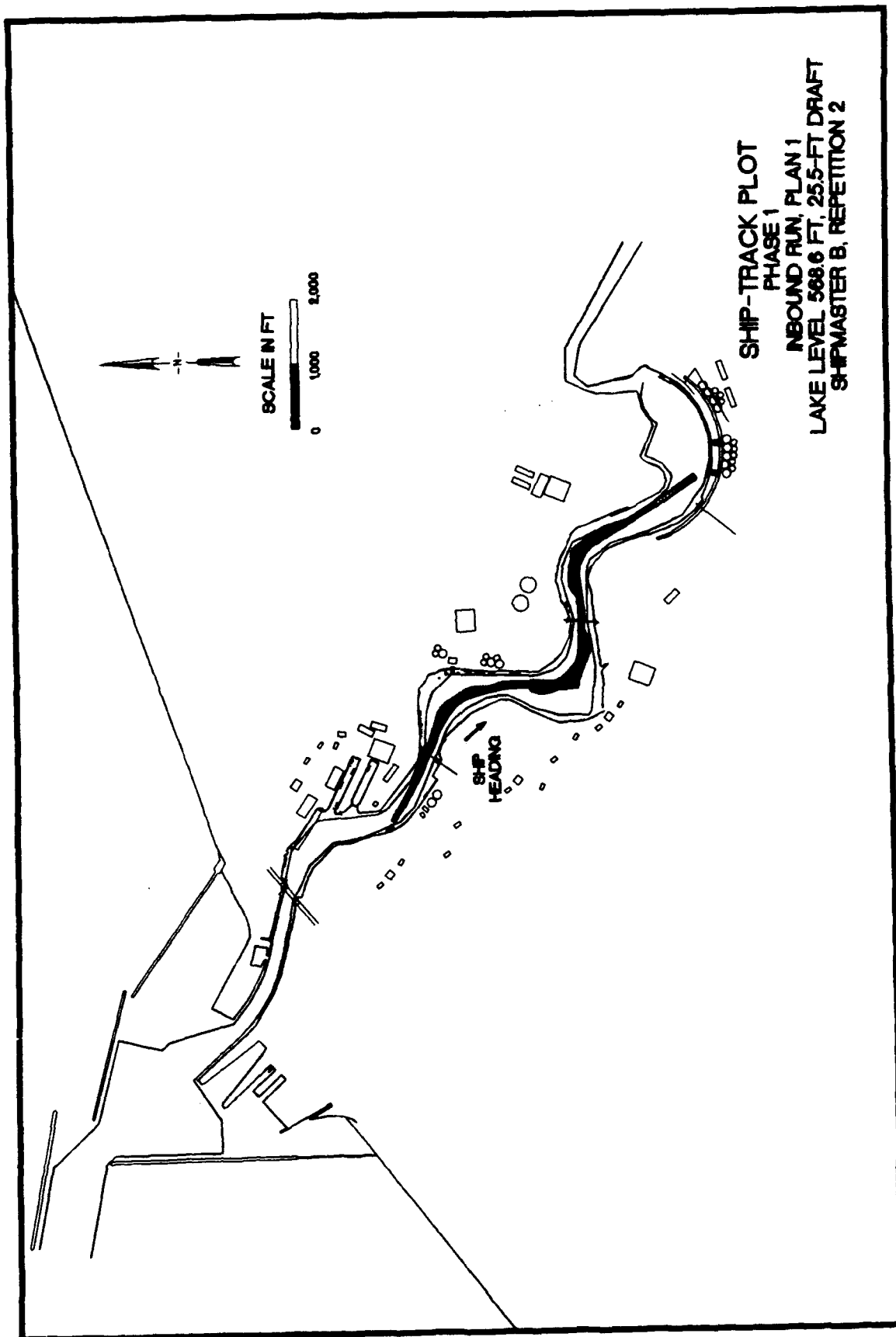
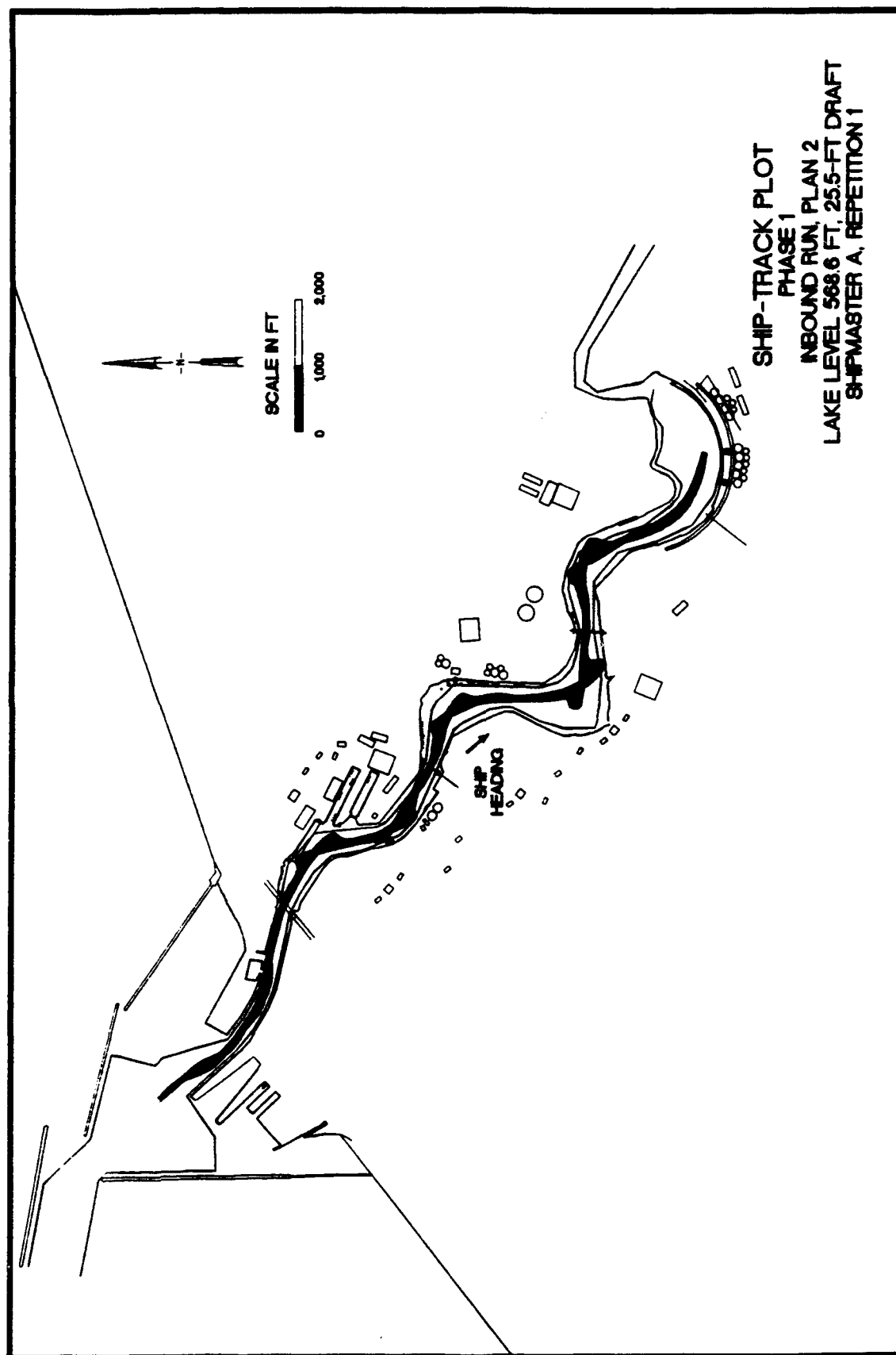


PLATE B6



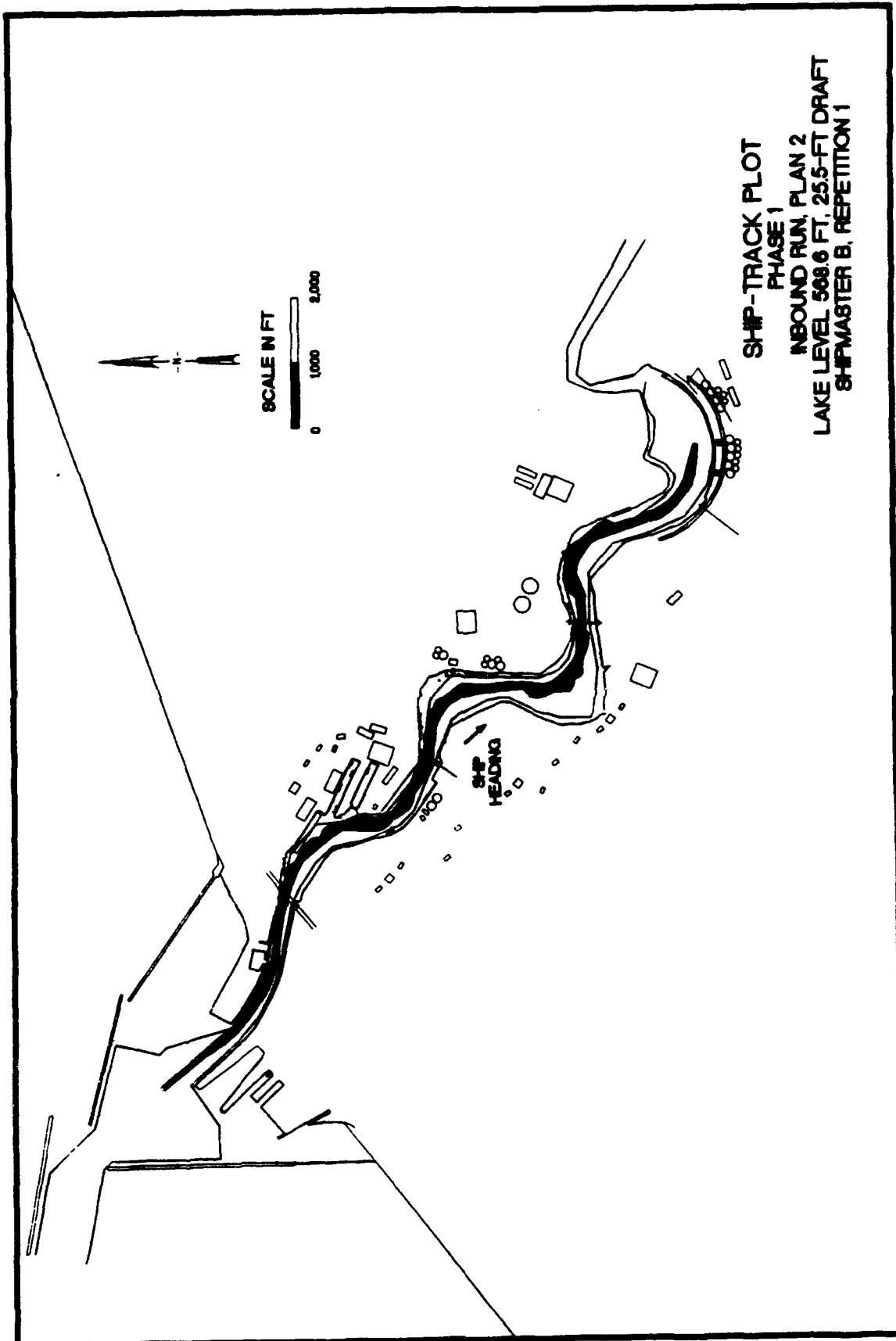
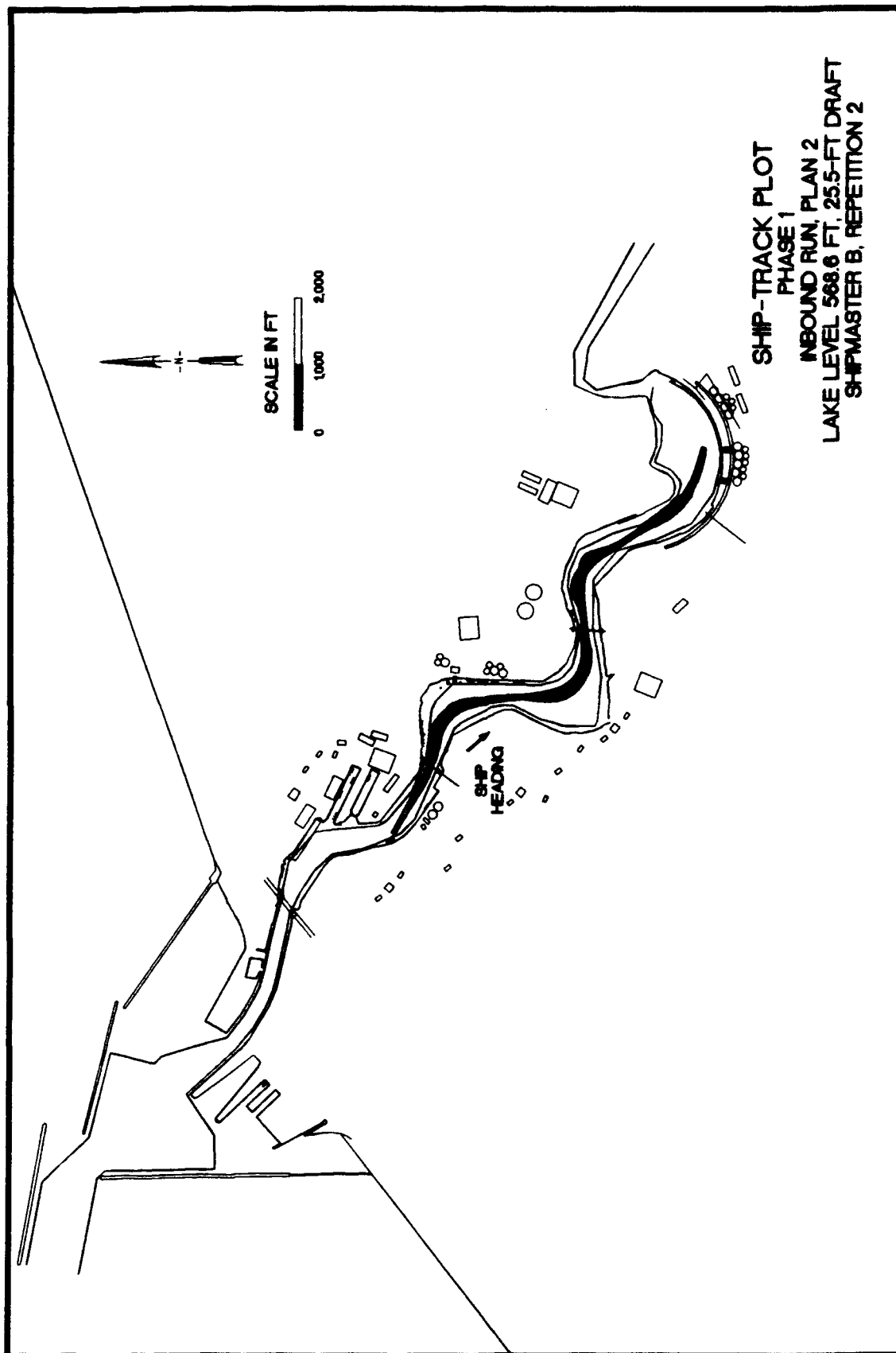


PLATE B8



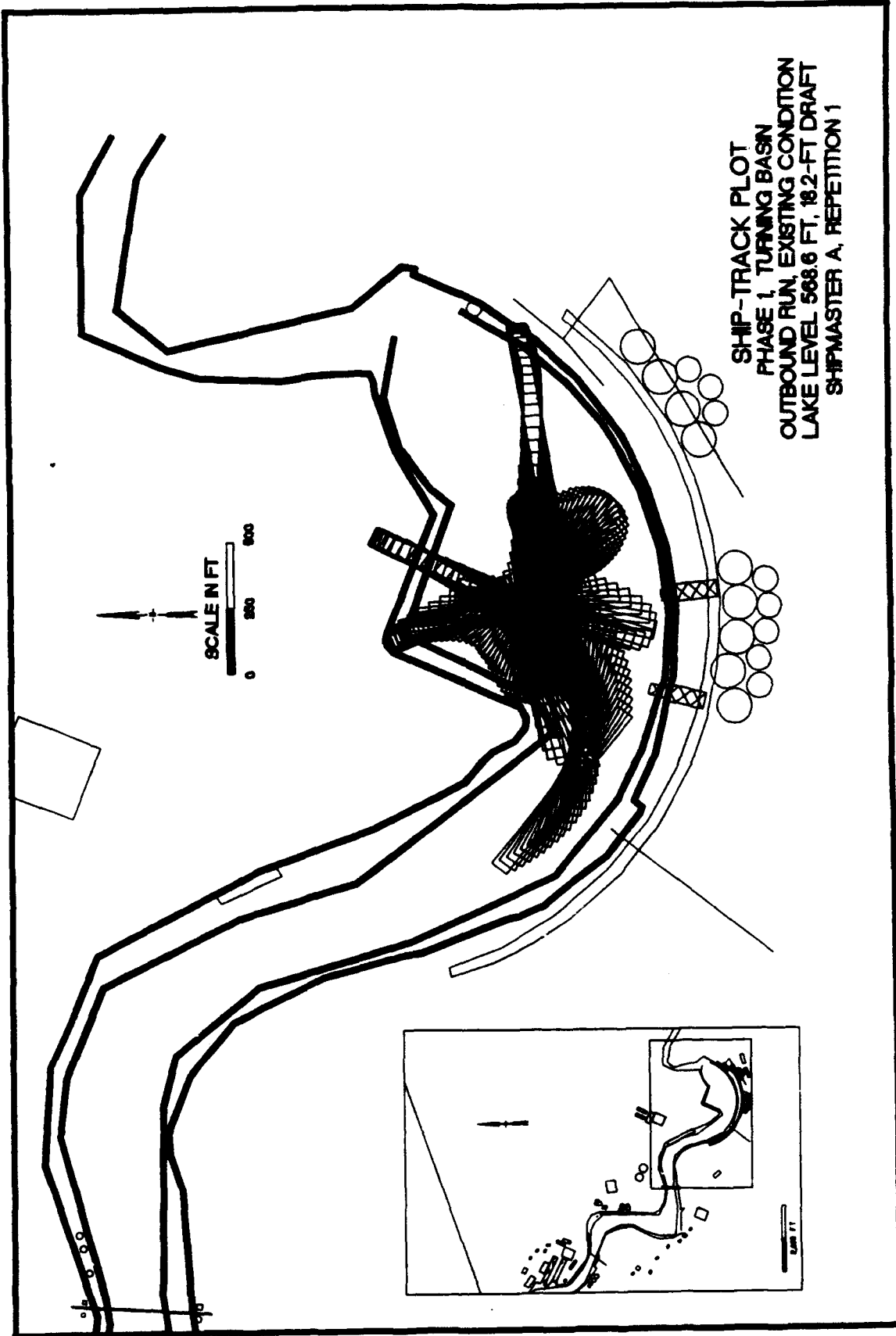


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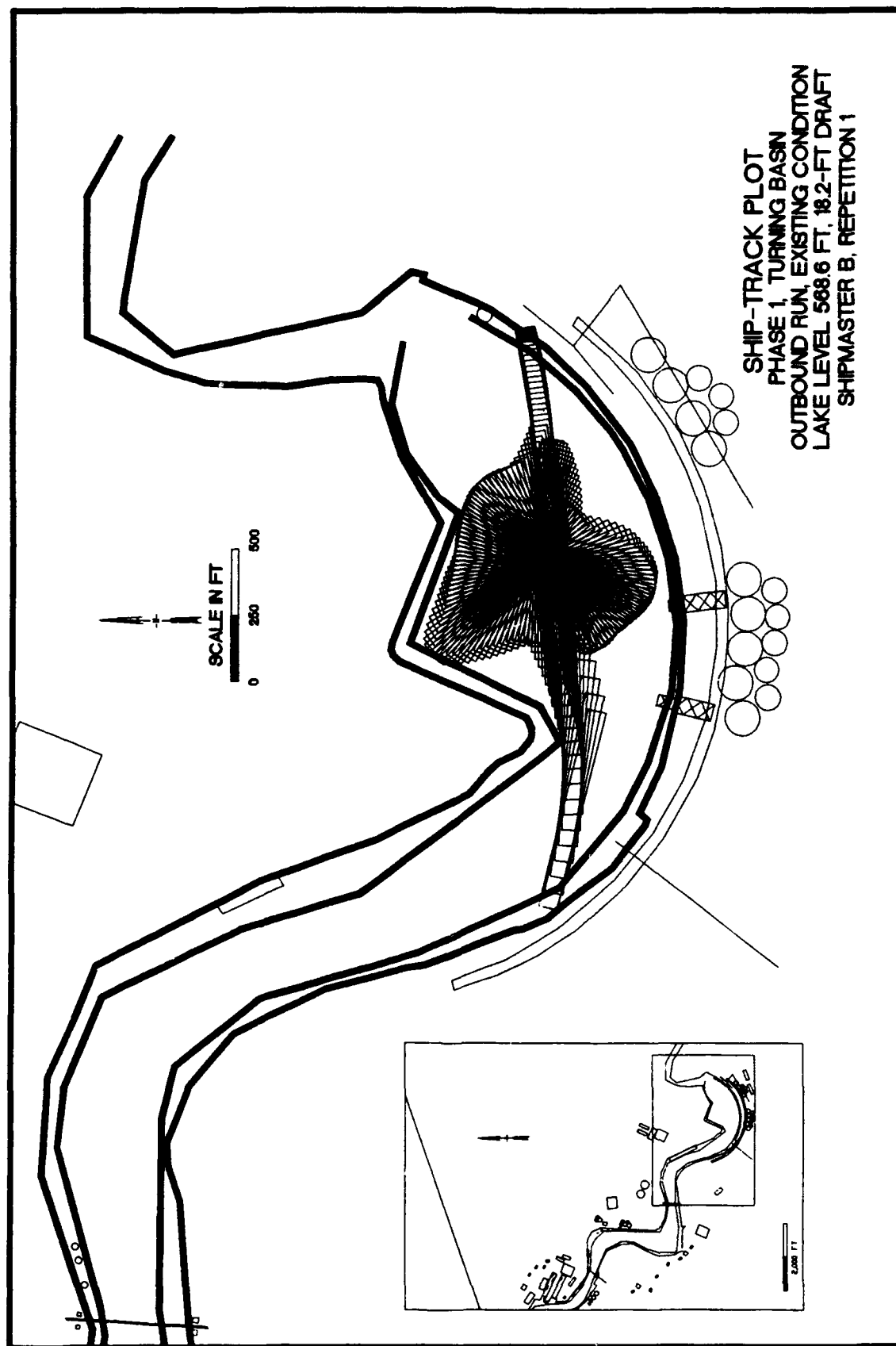


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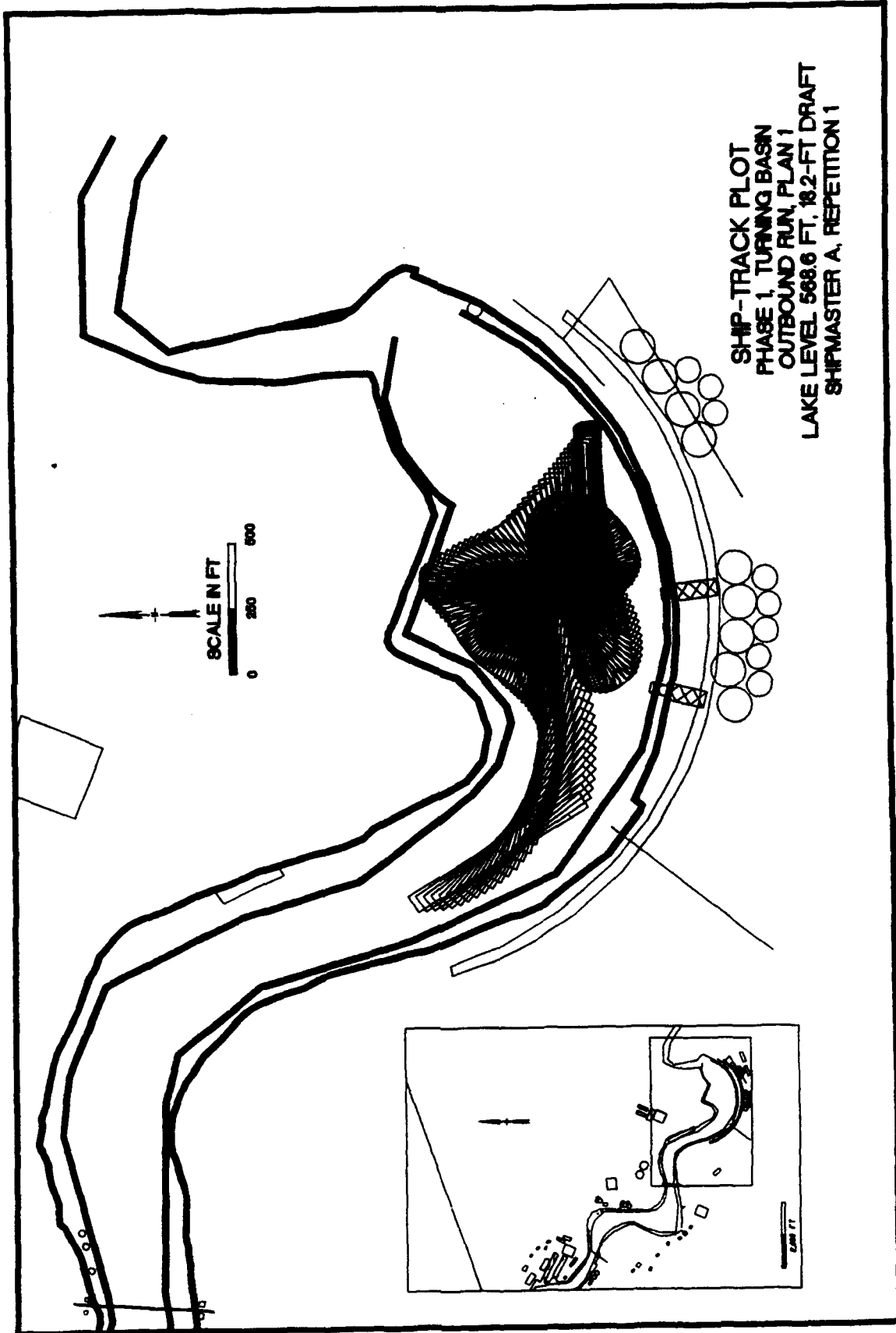
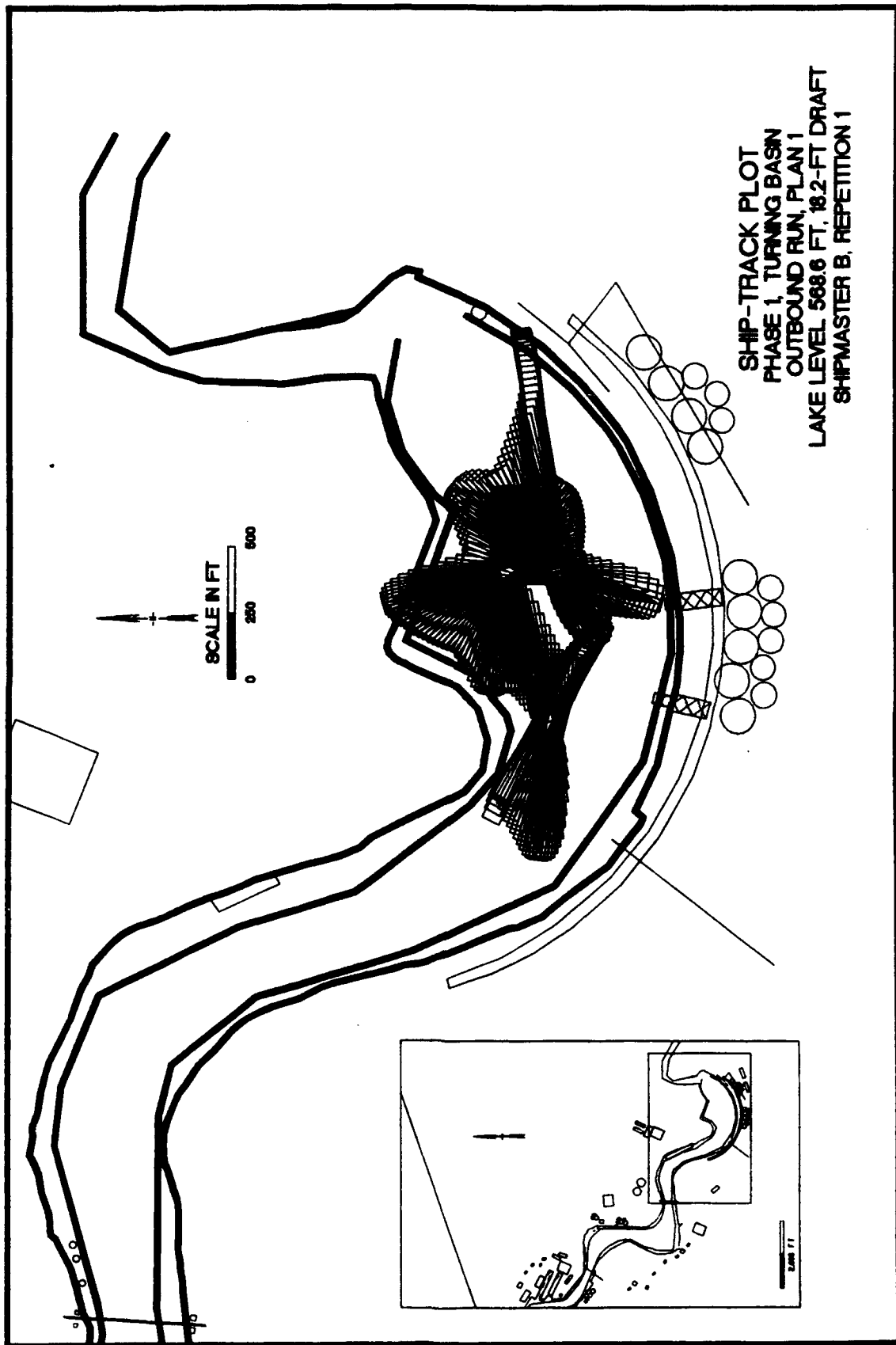


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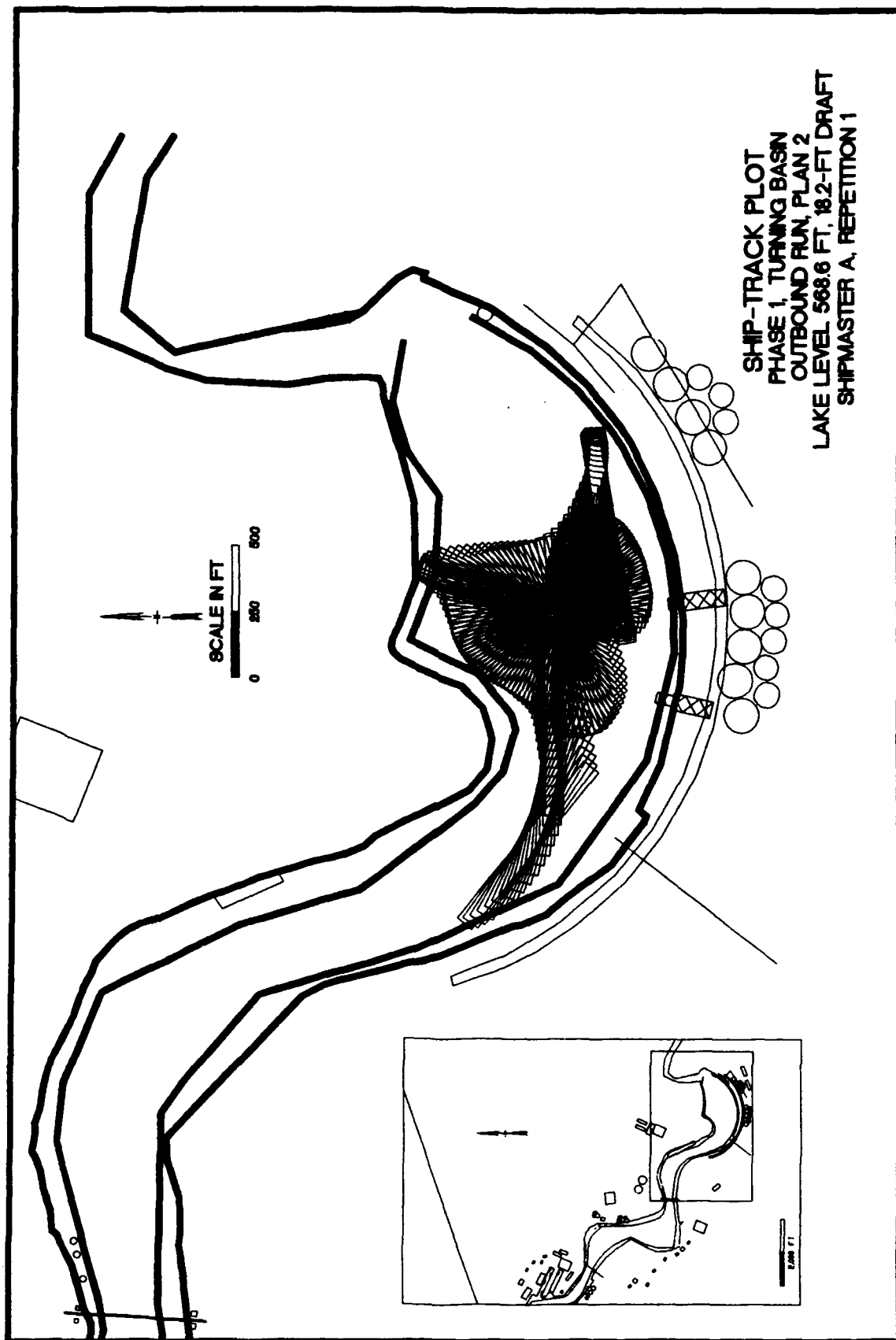


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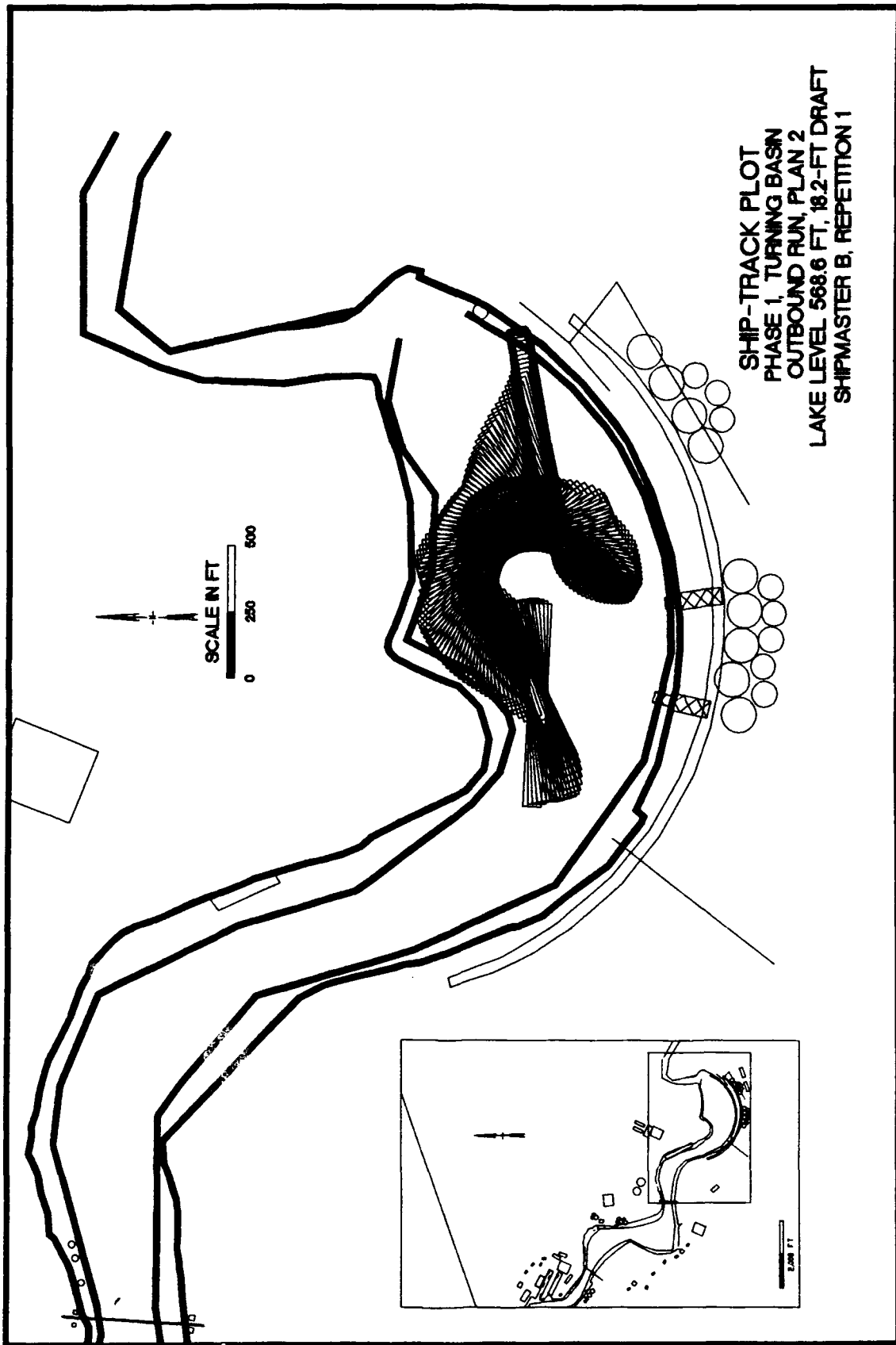


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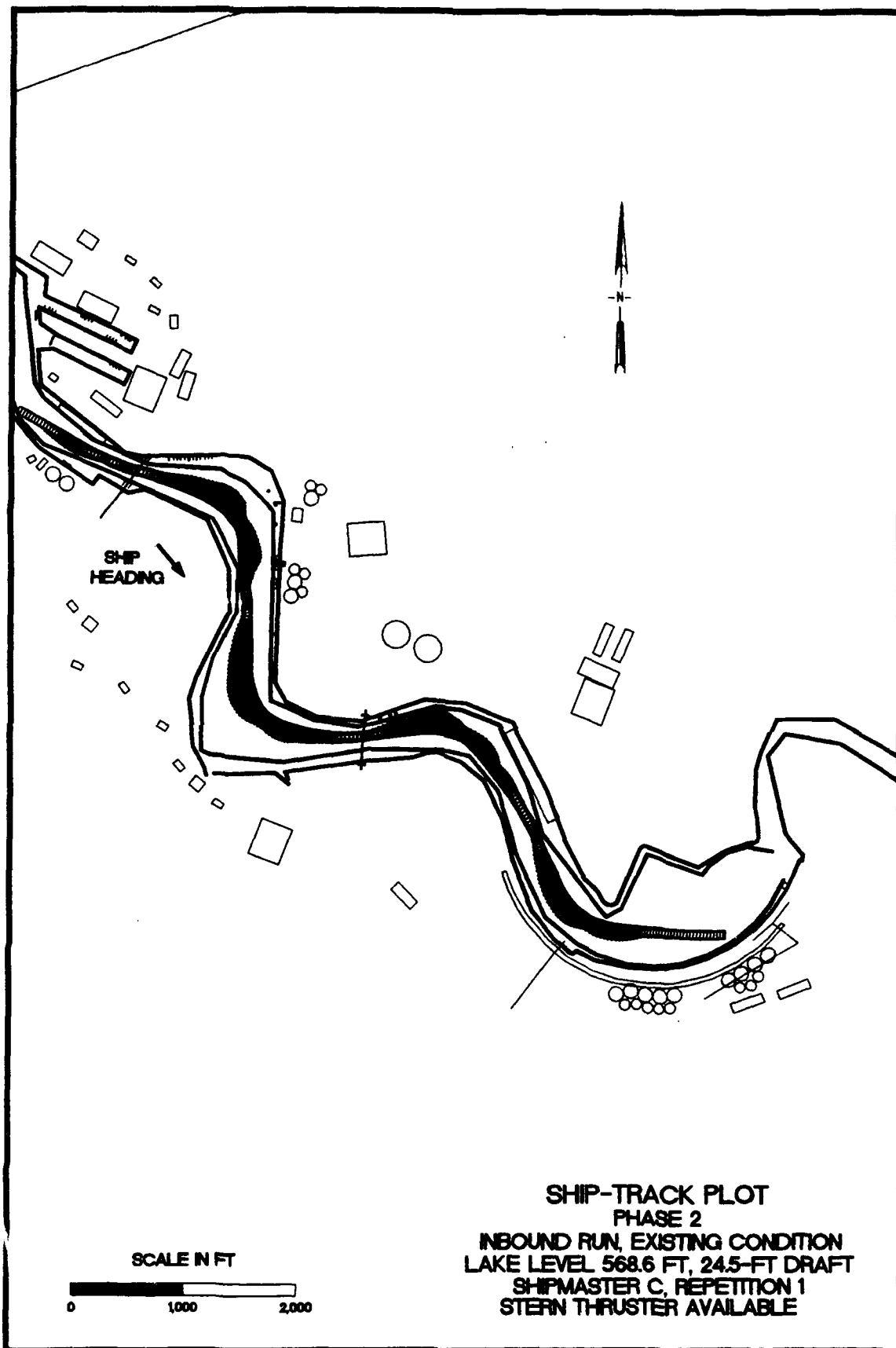
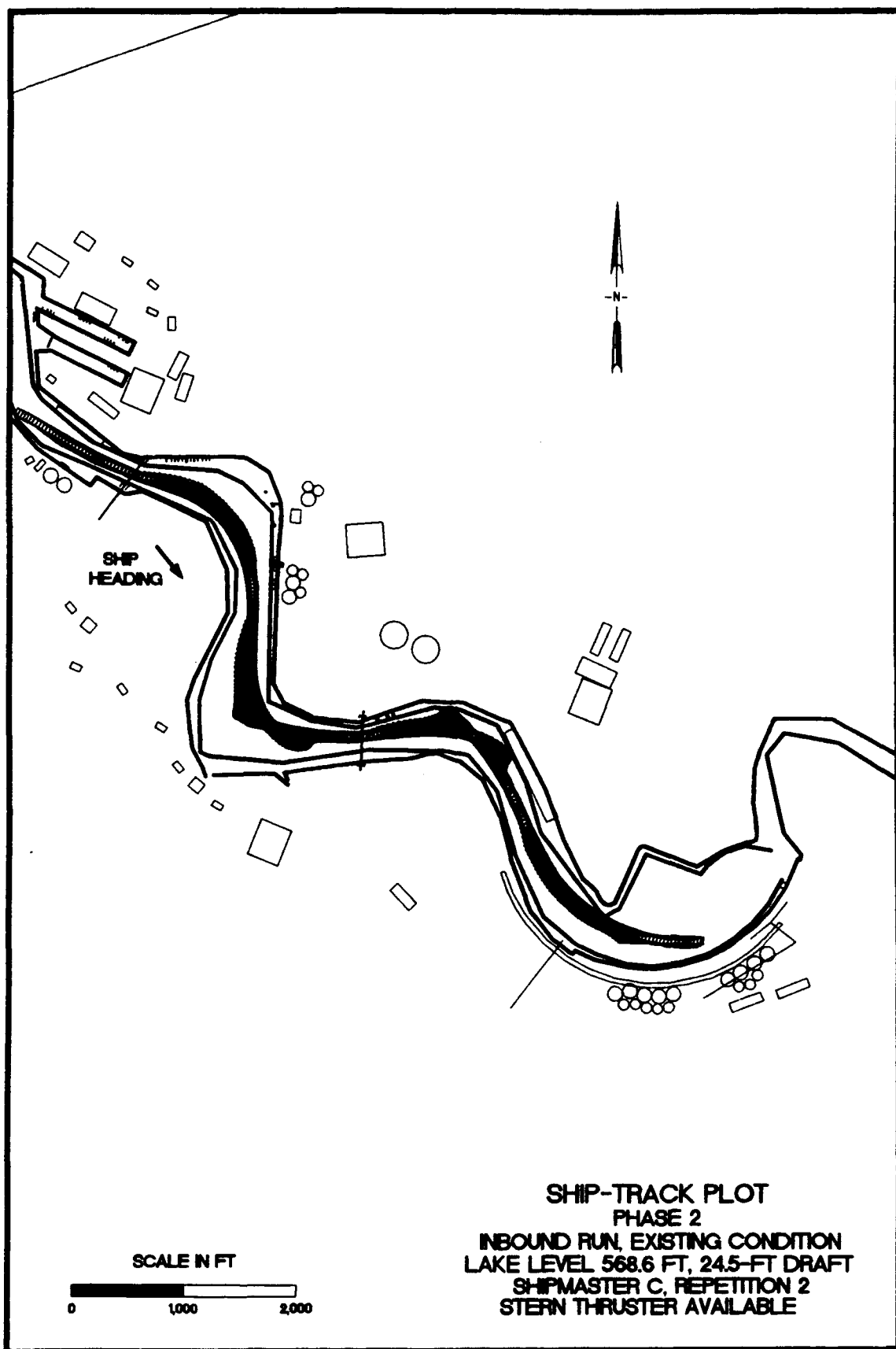


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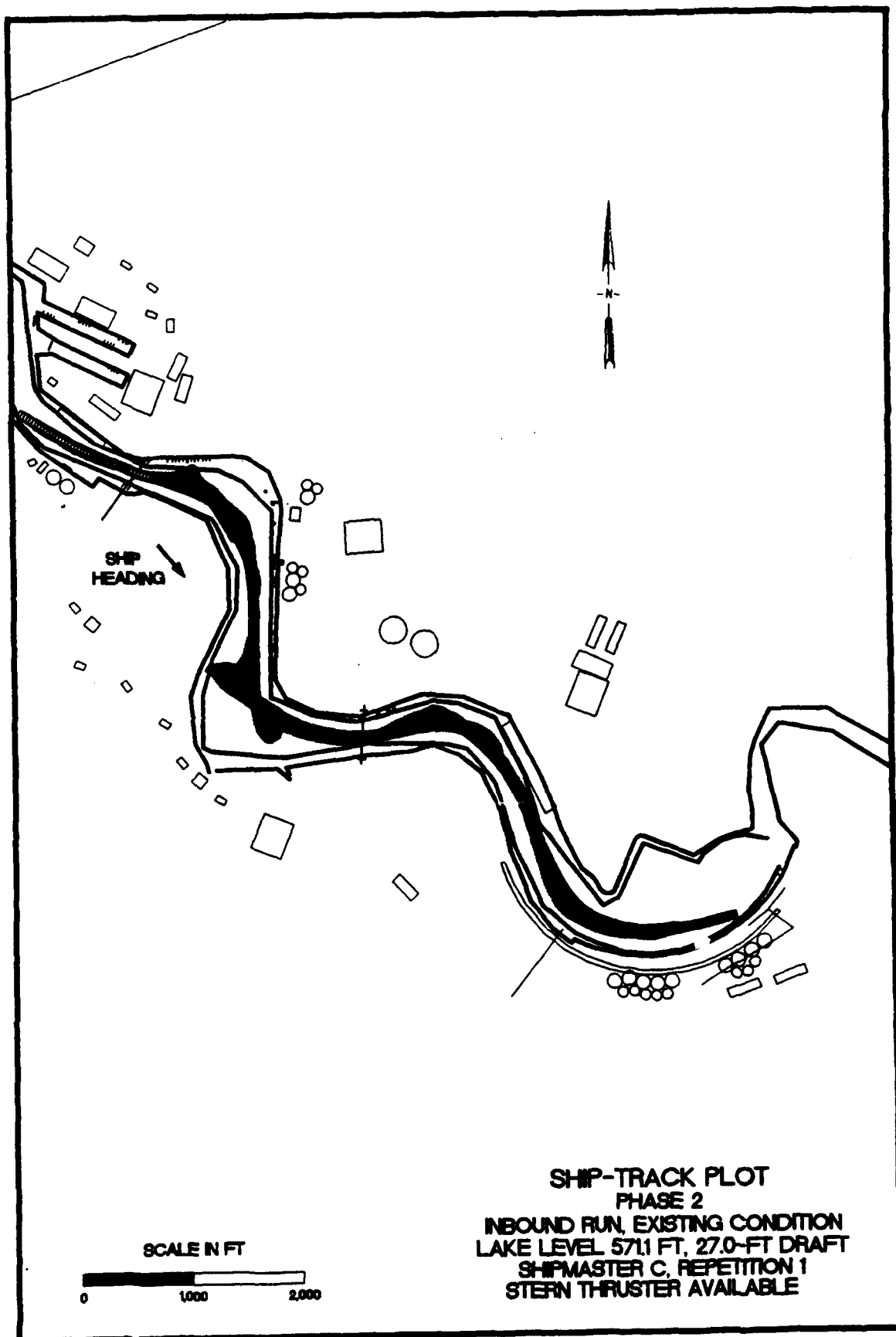
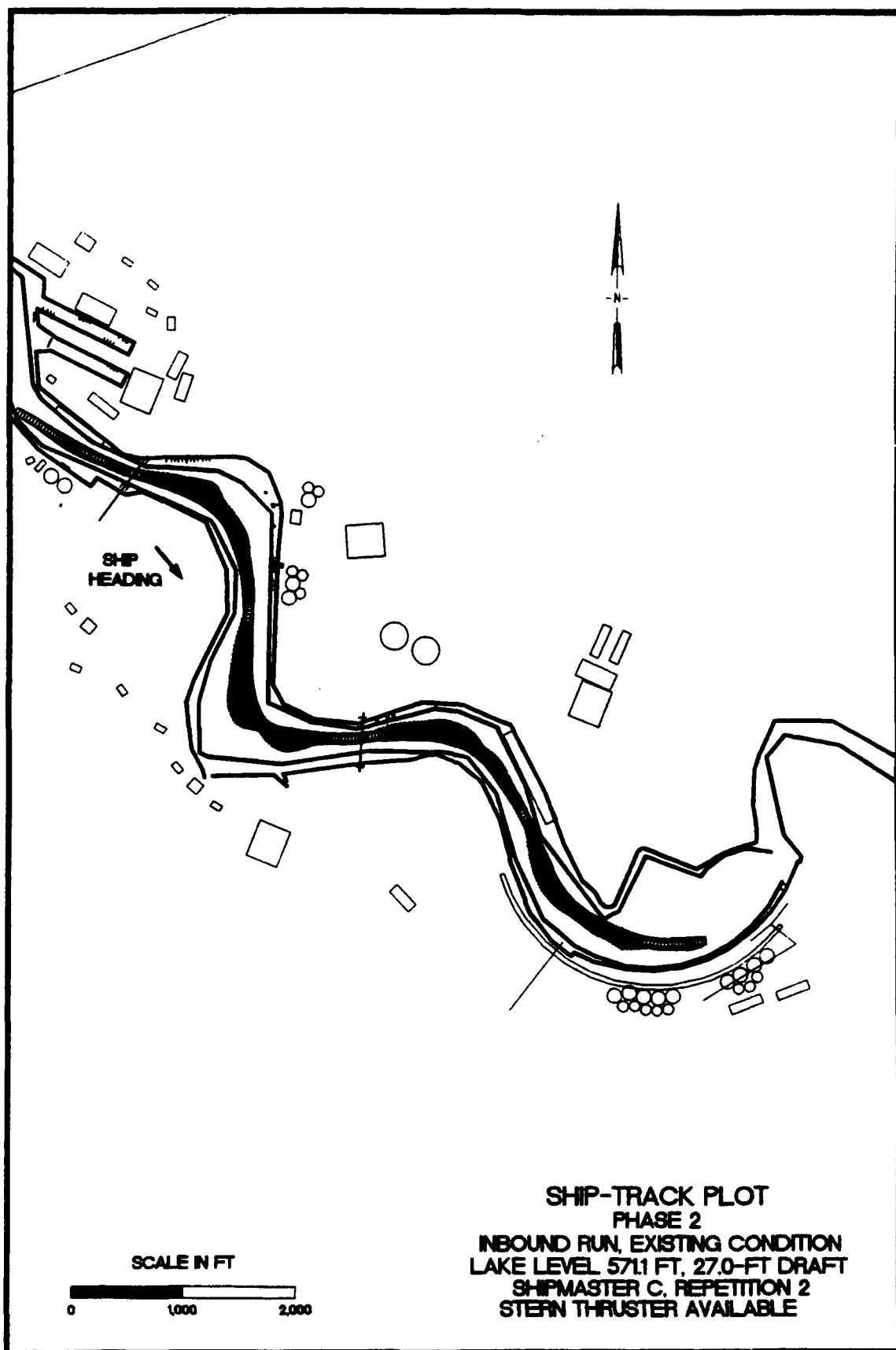


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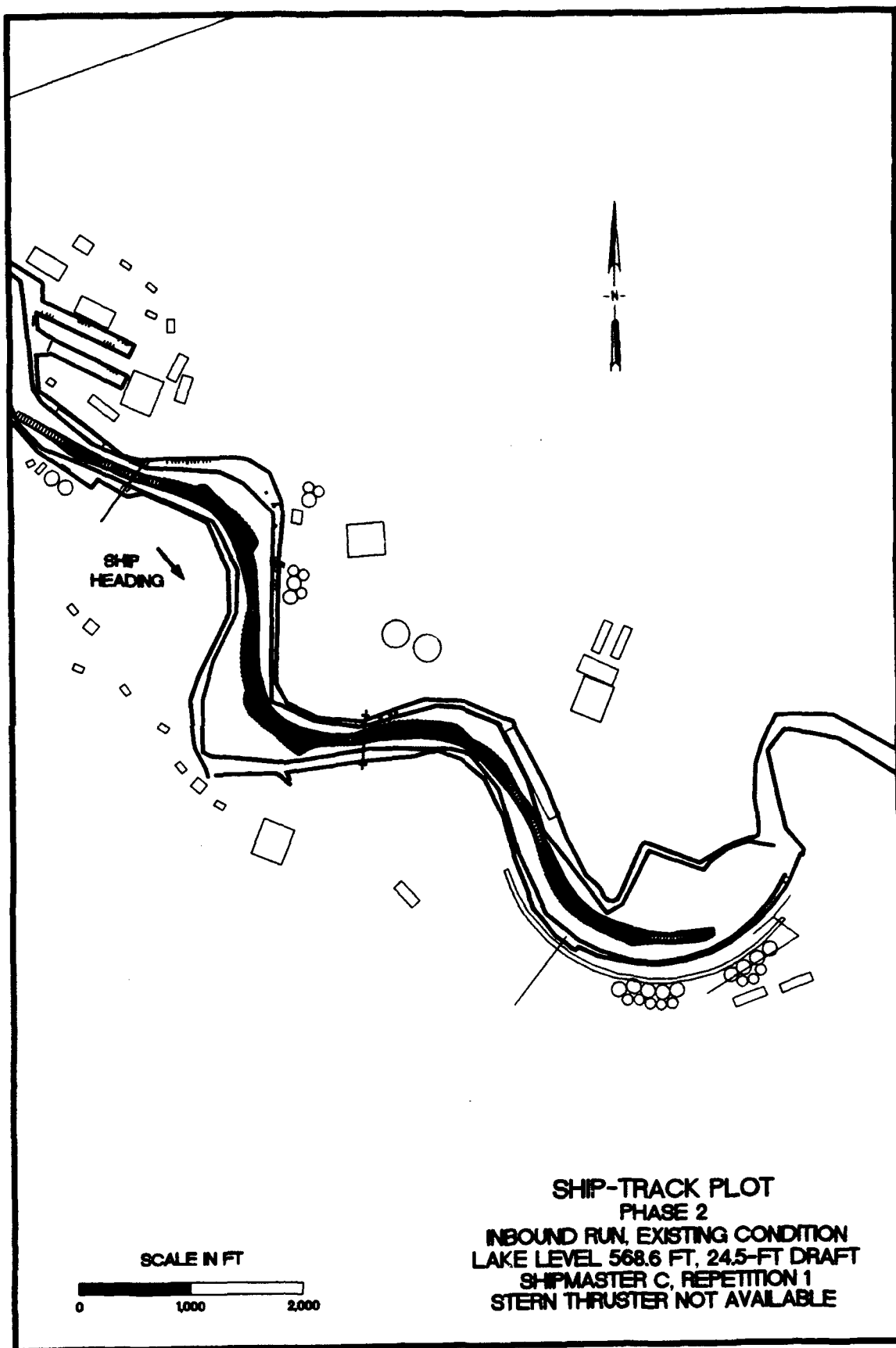
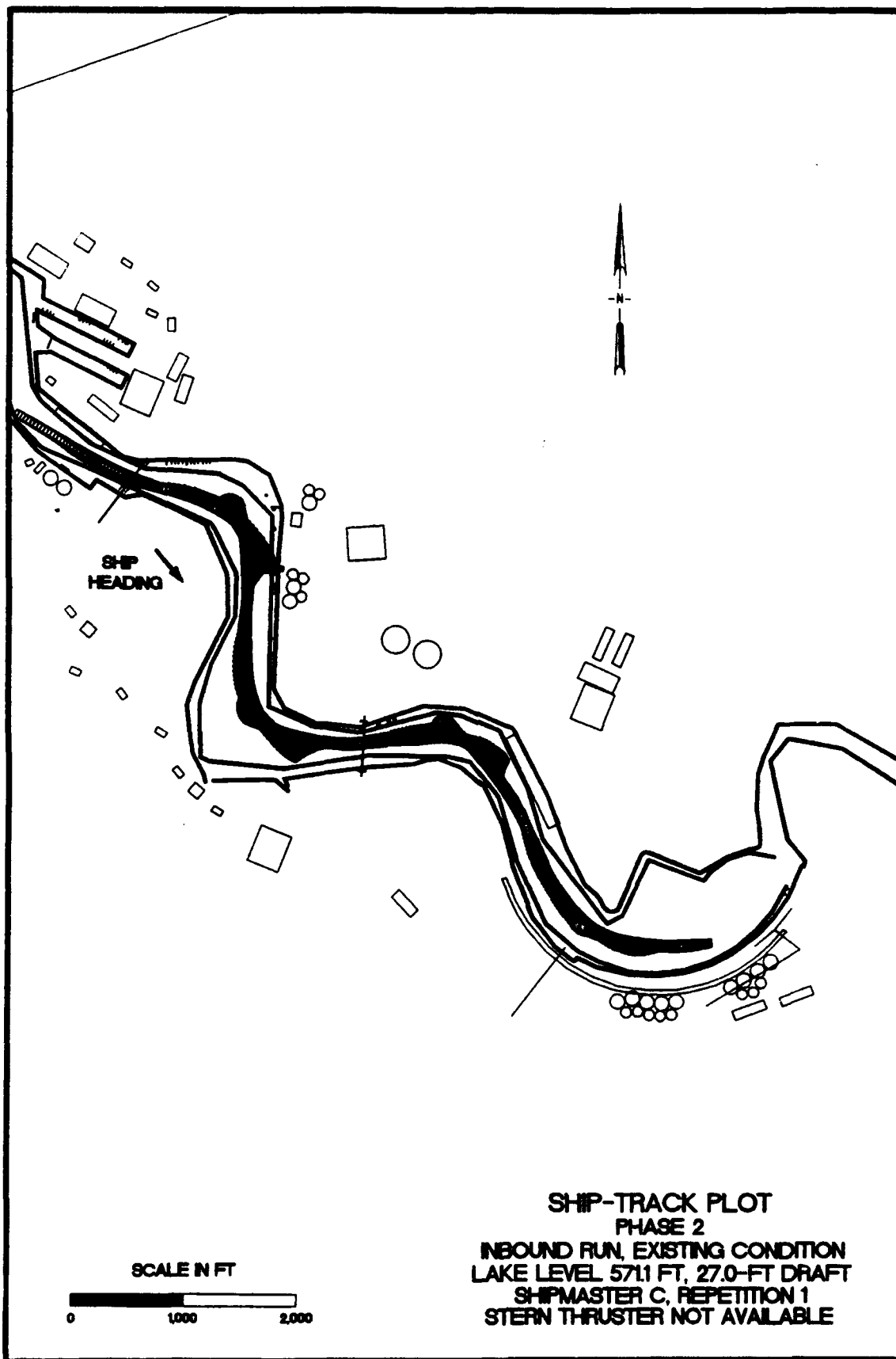


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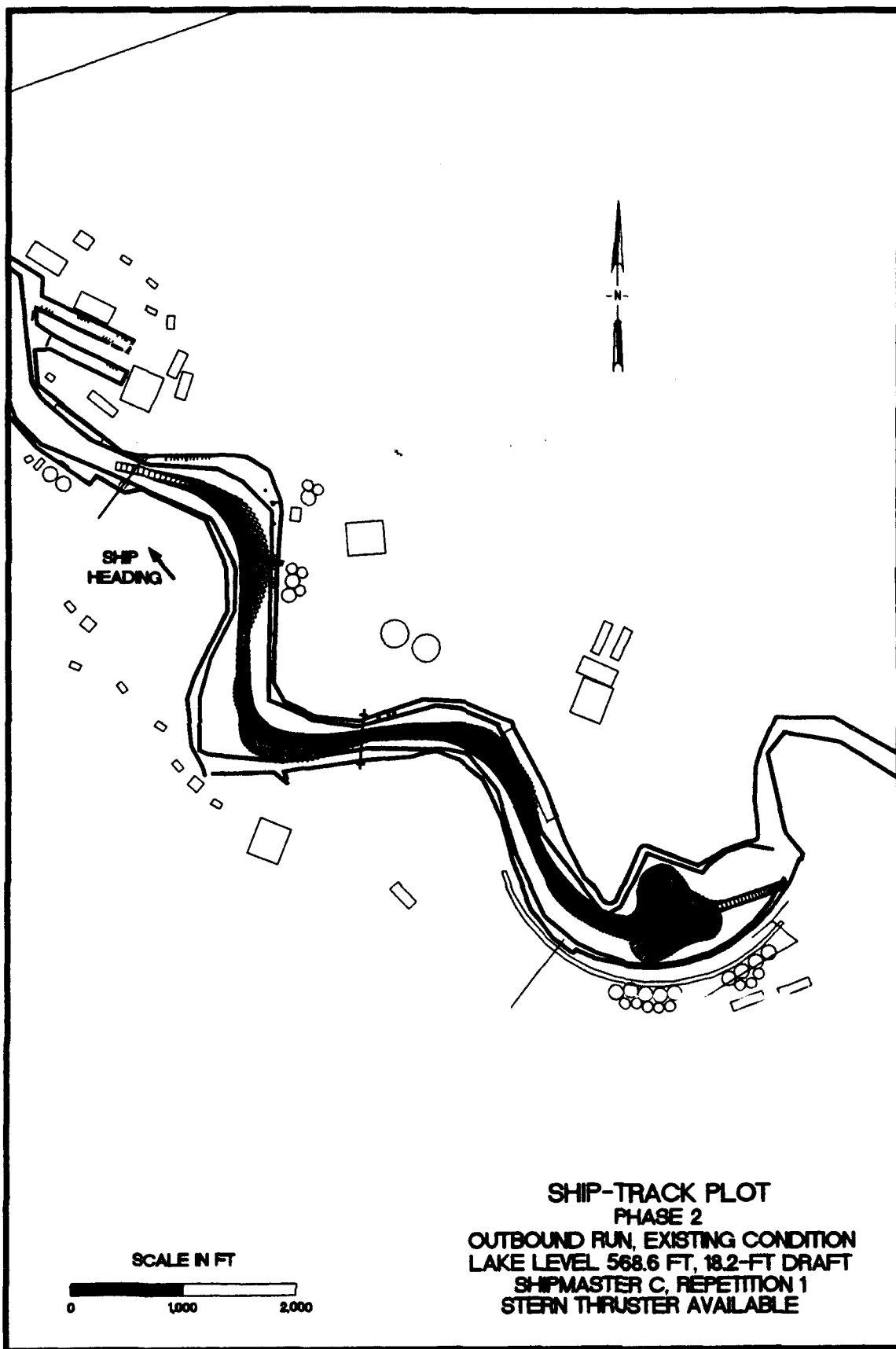
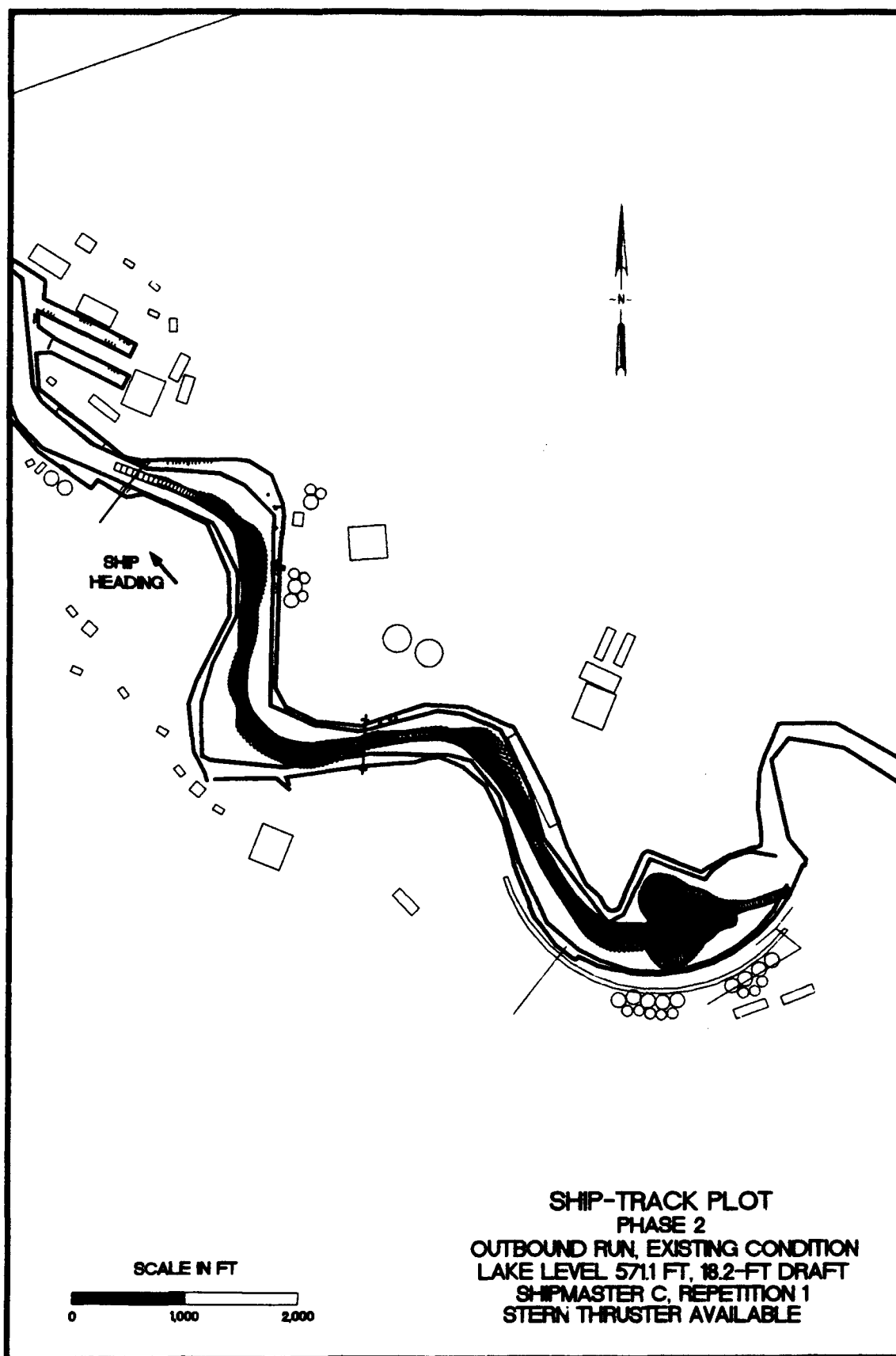


PLATE B22.



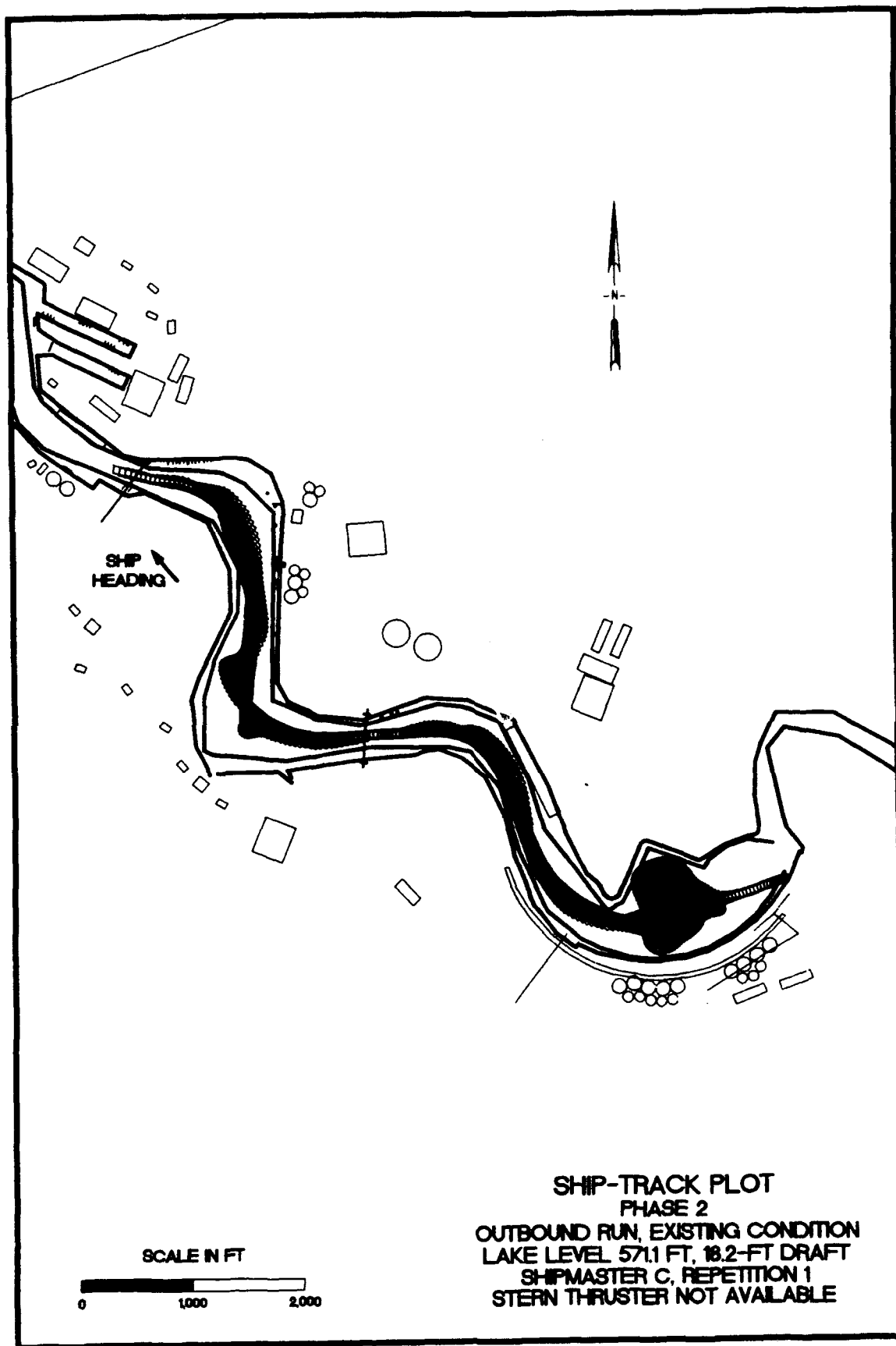
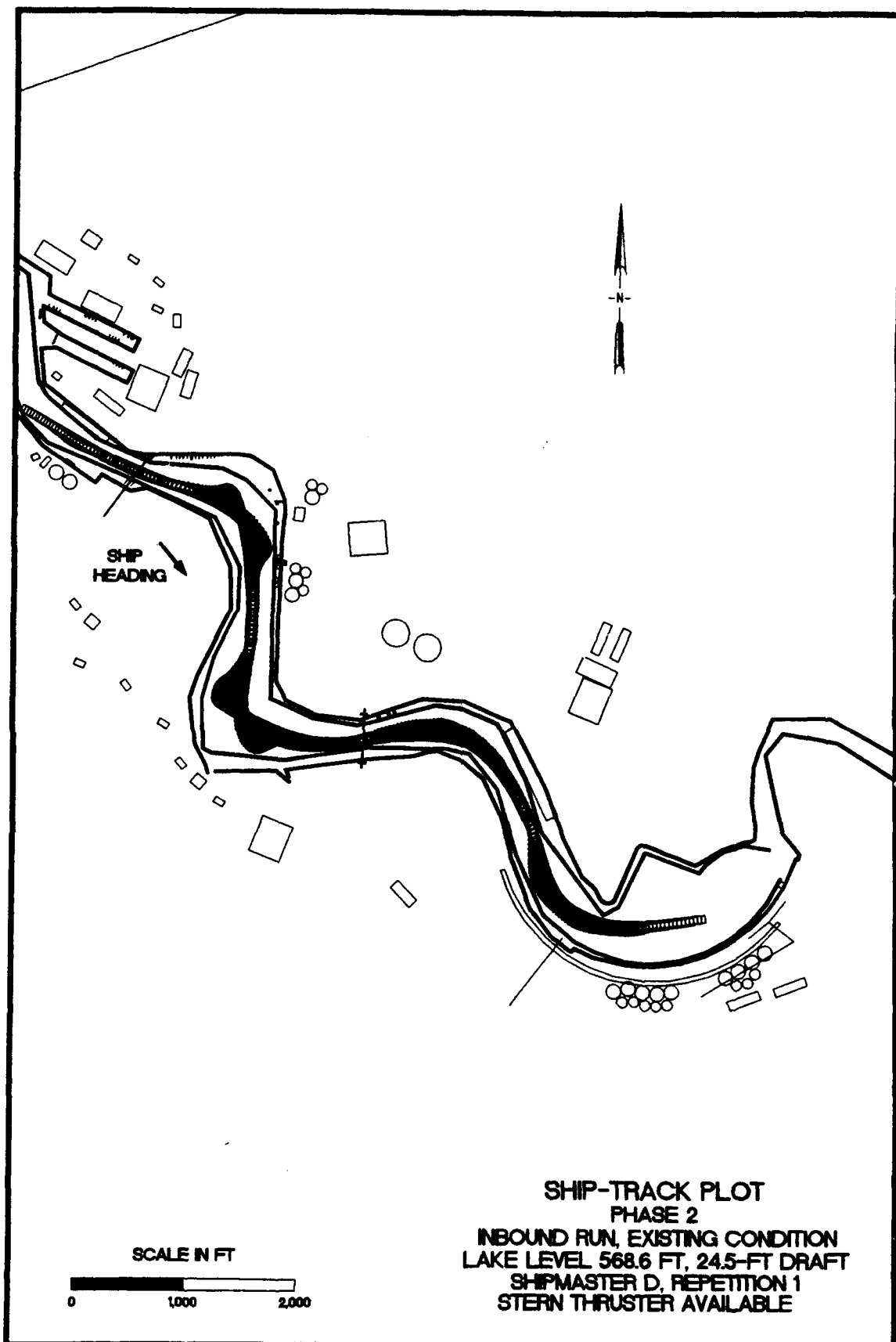


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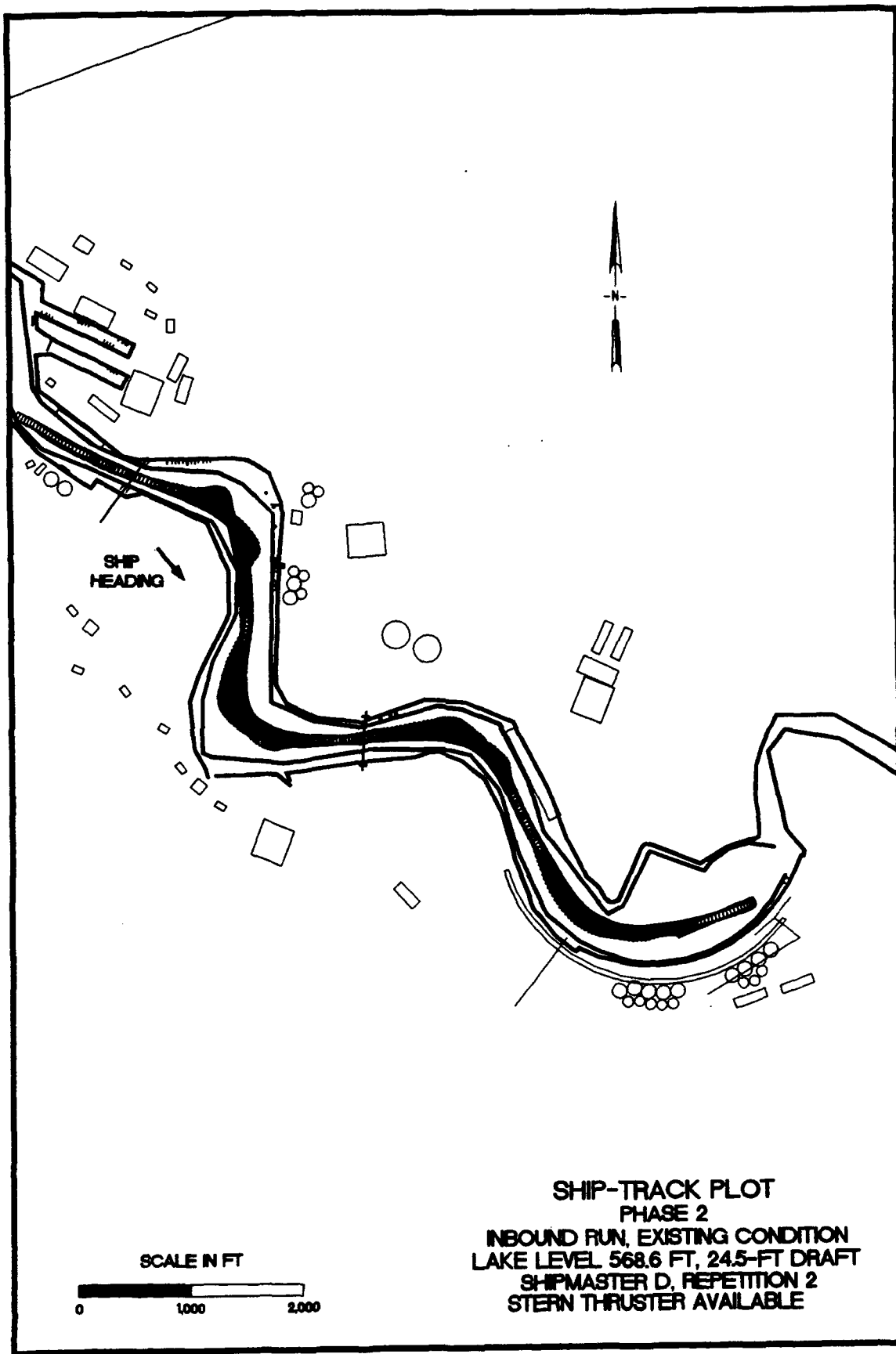
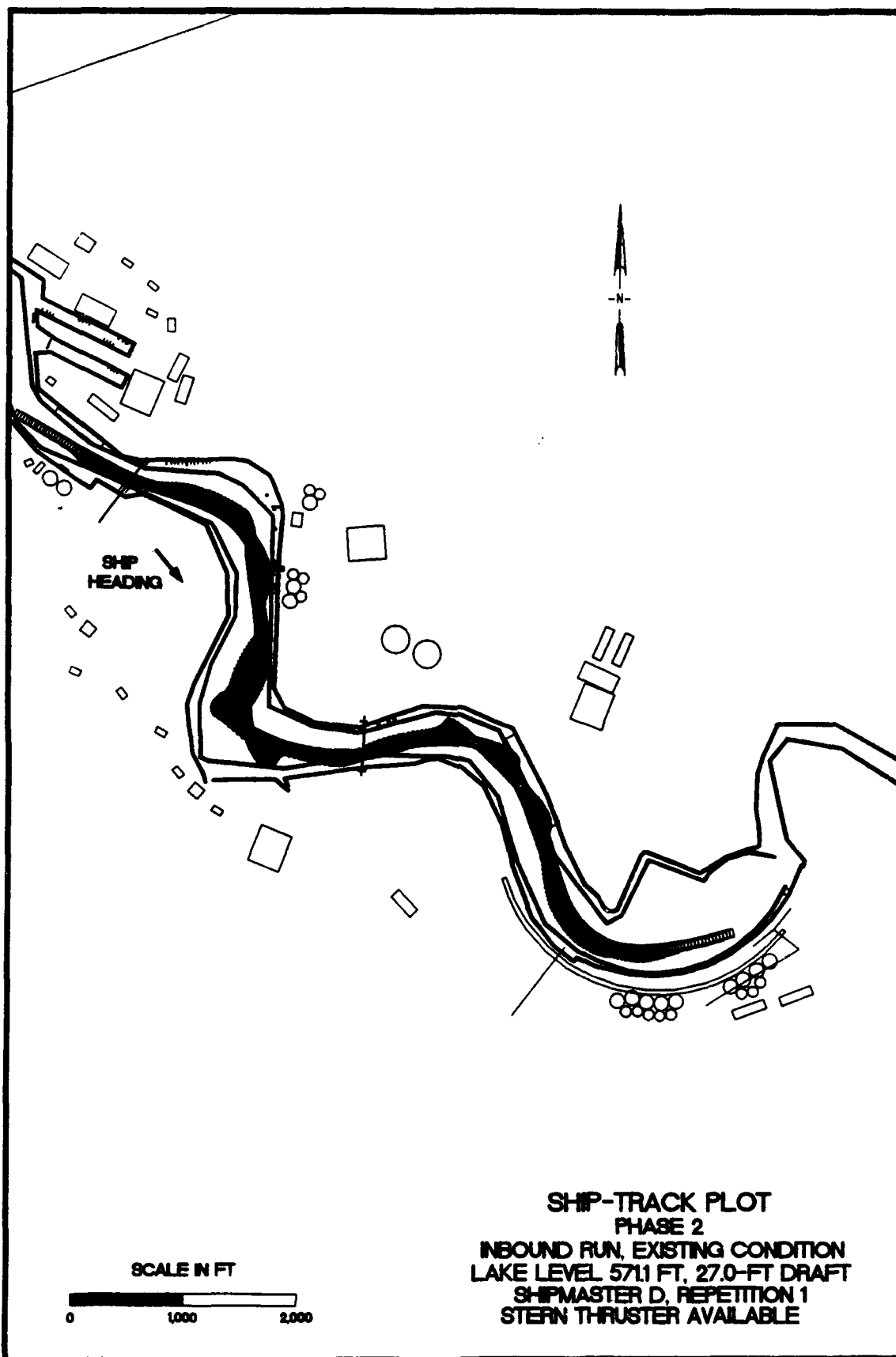


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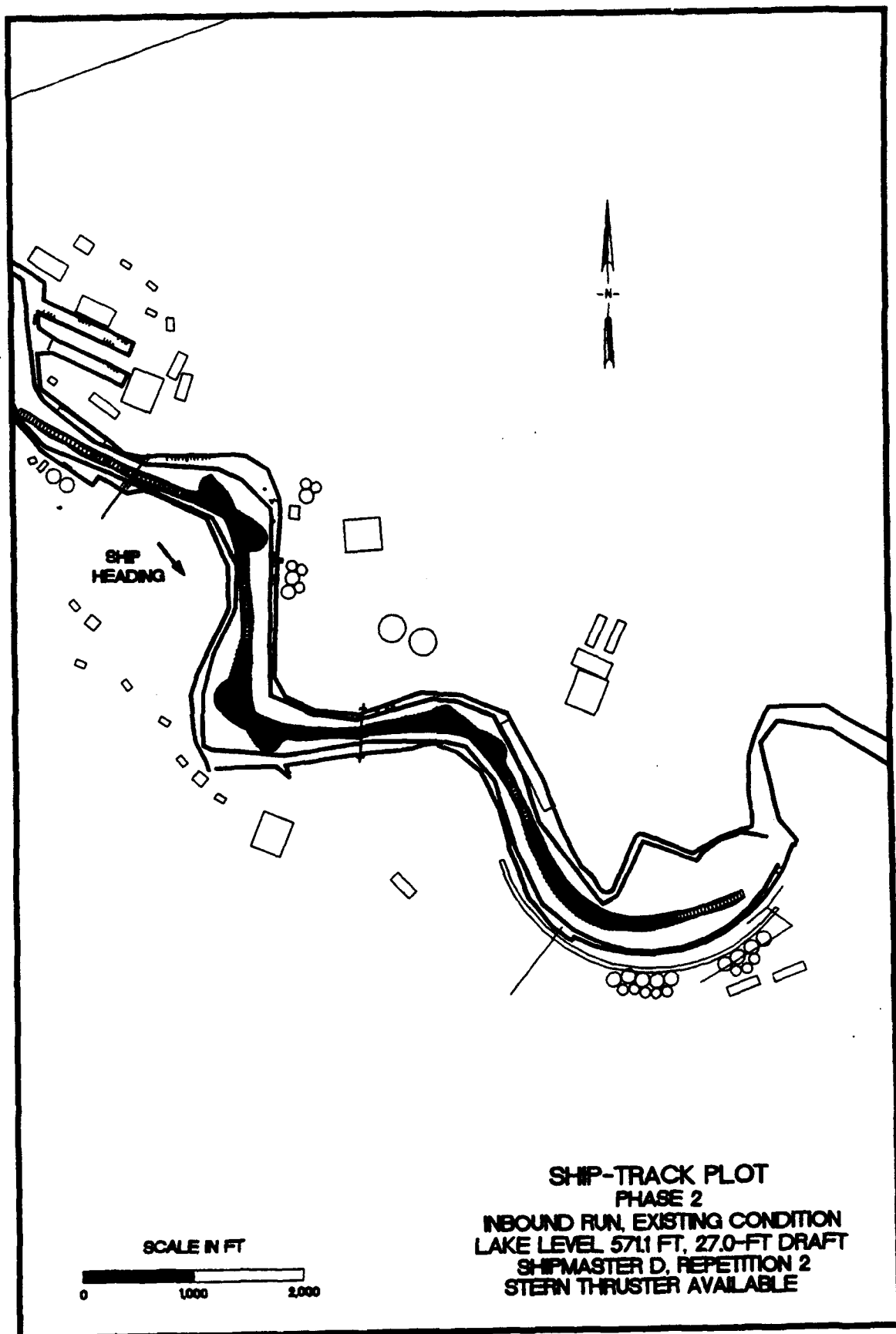
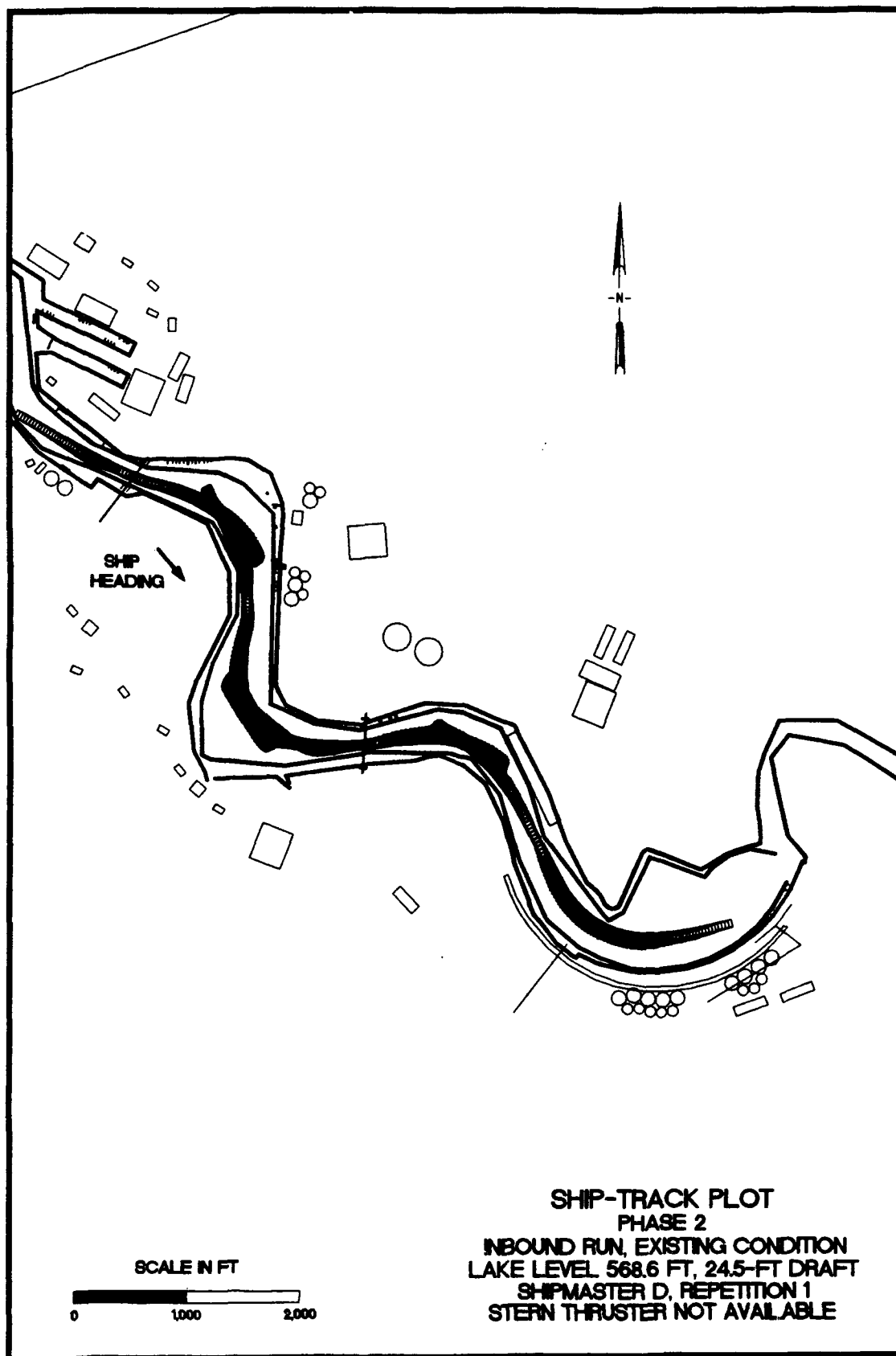


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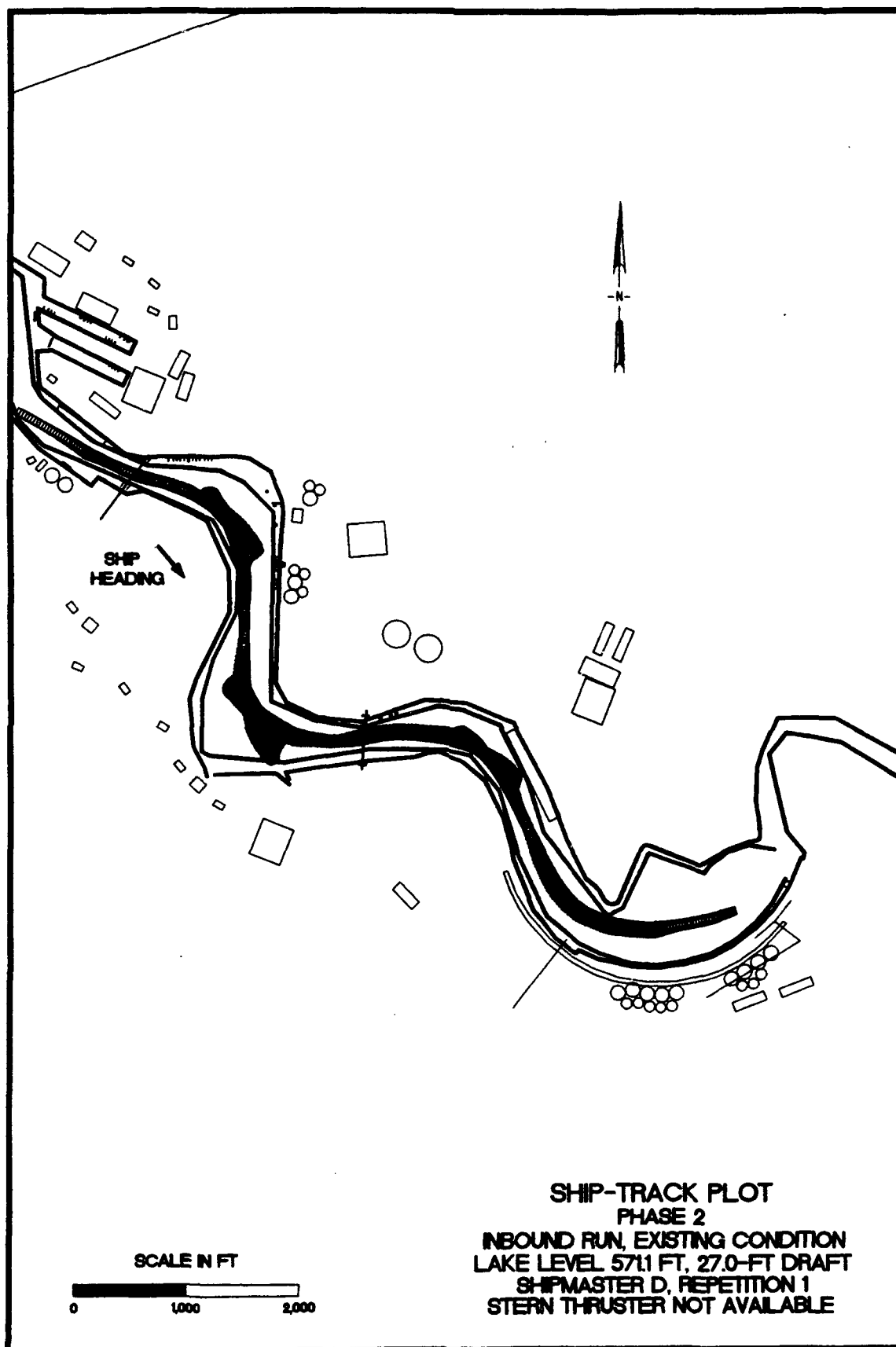
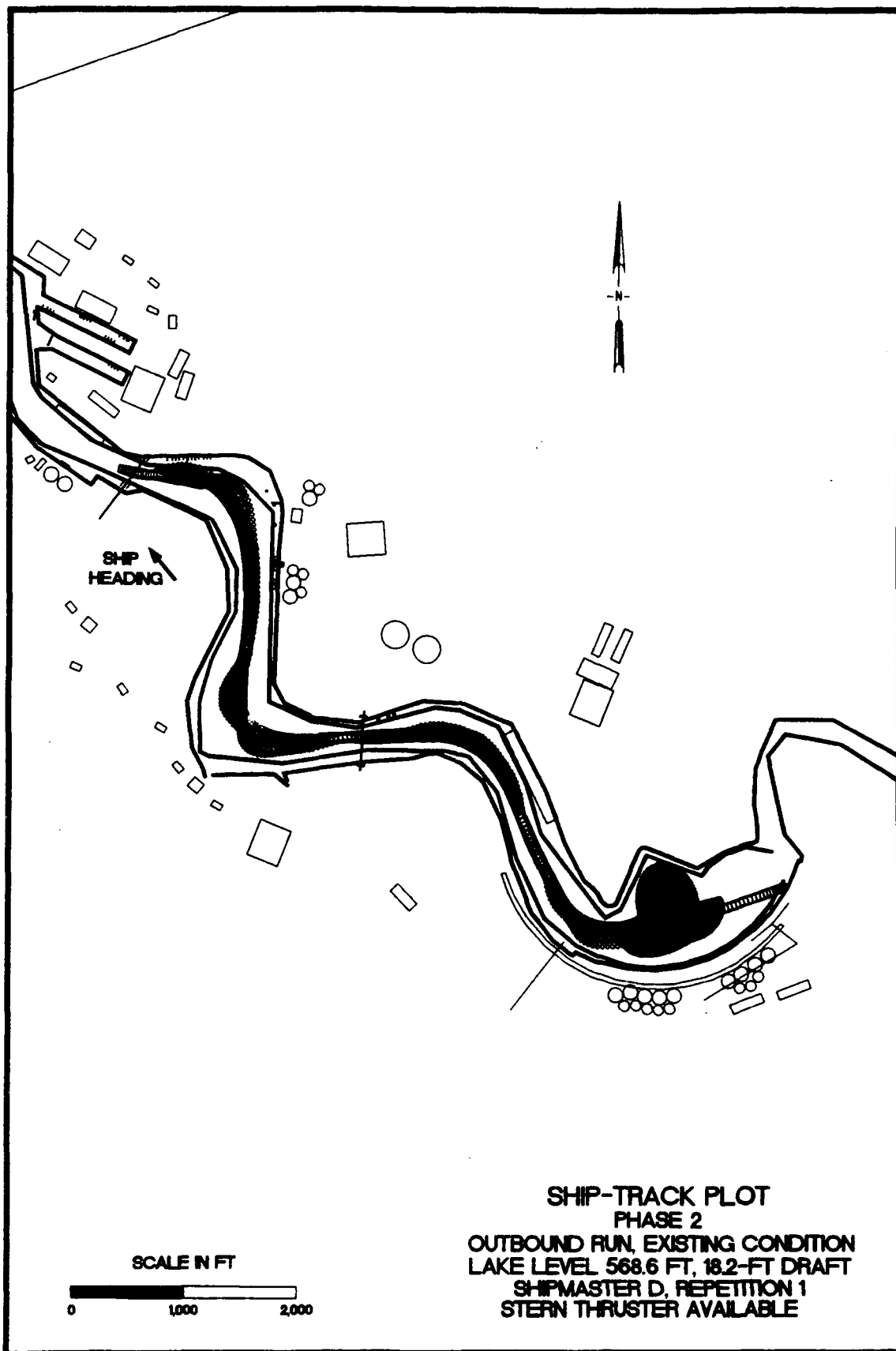


PLATE B30



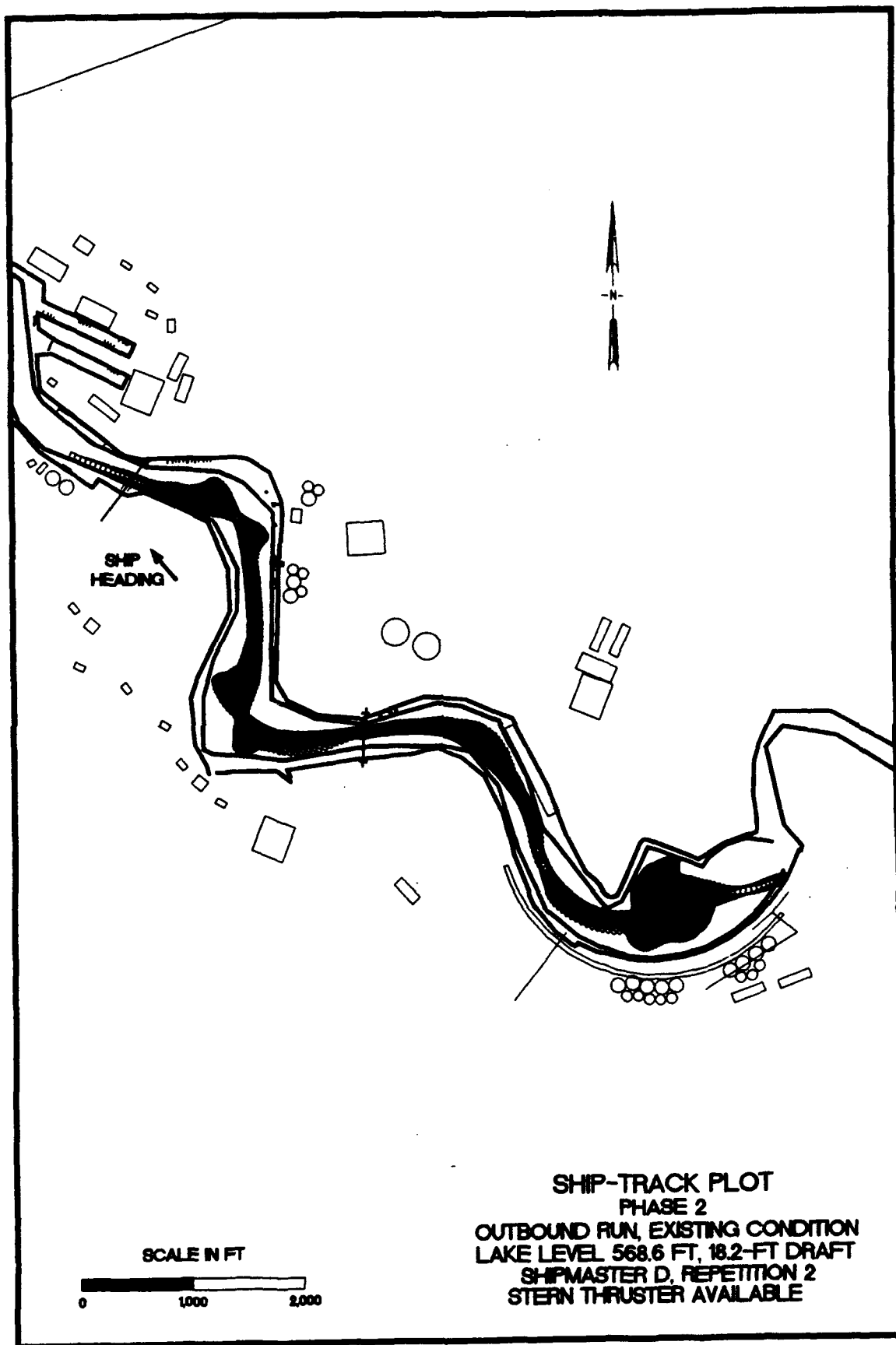
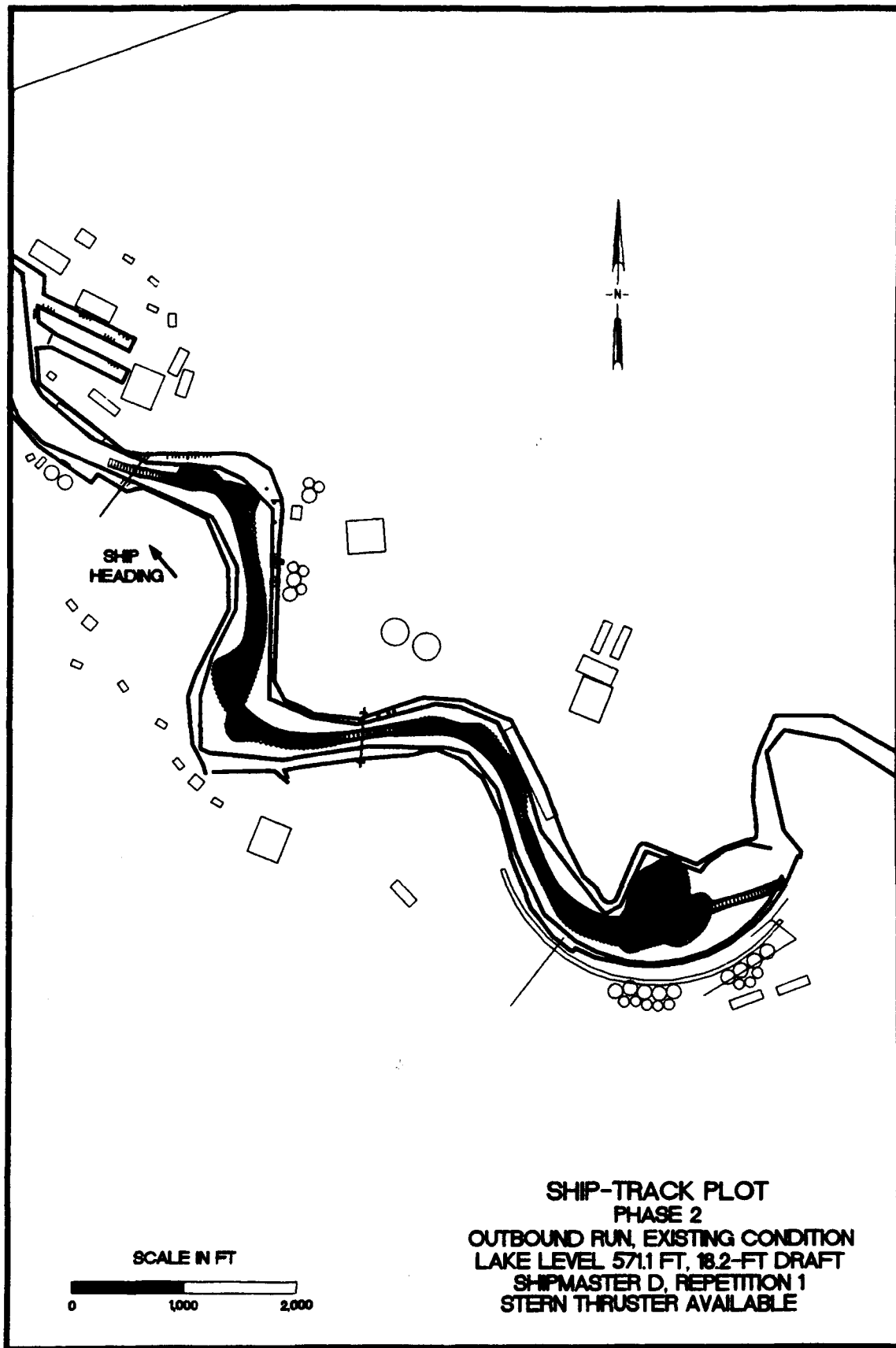


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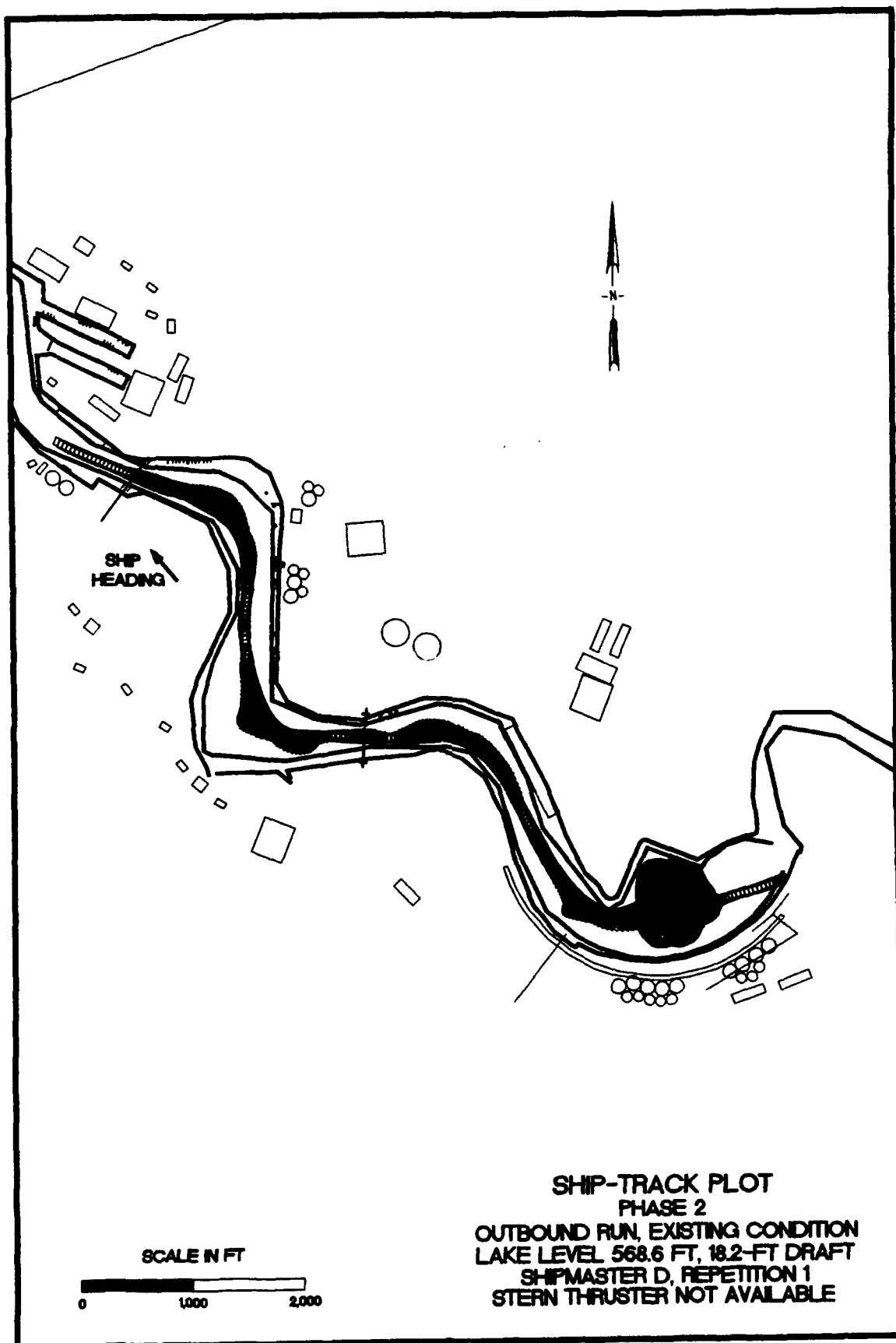
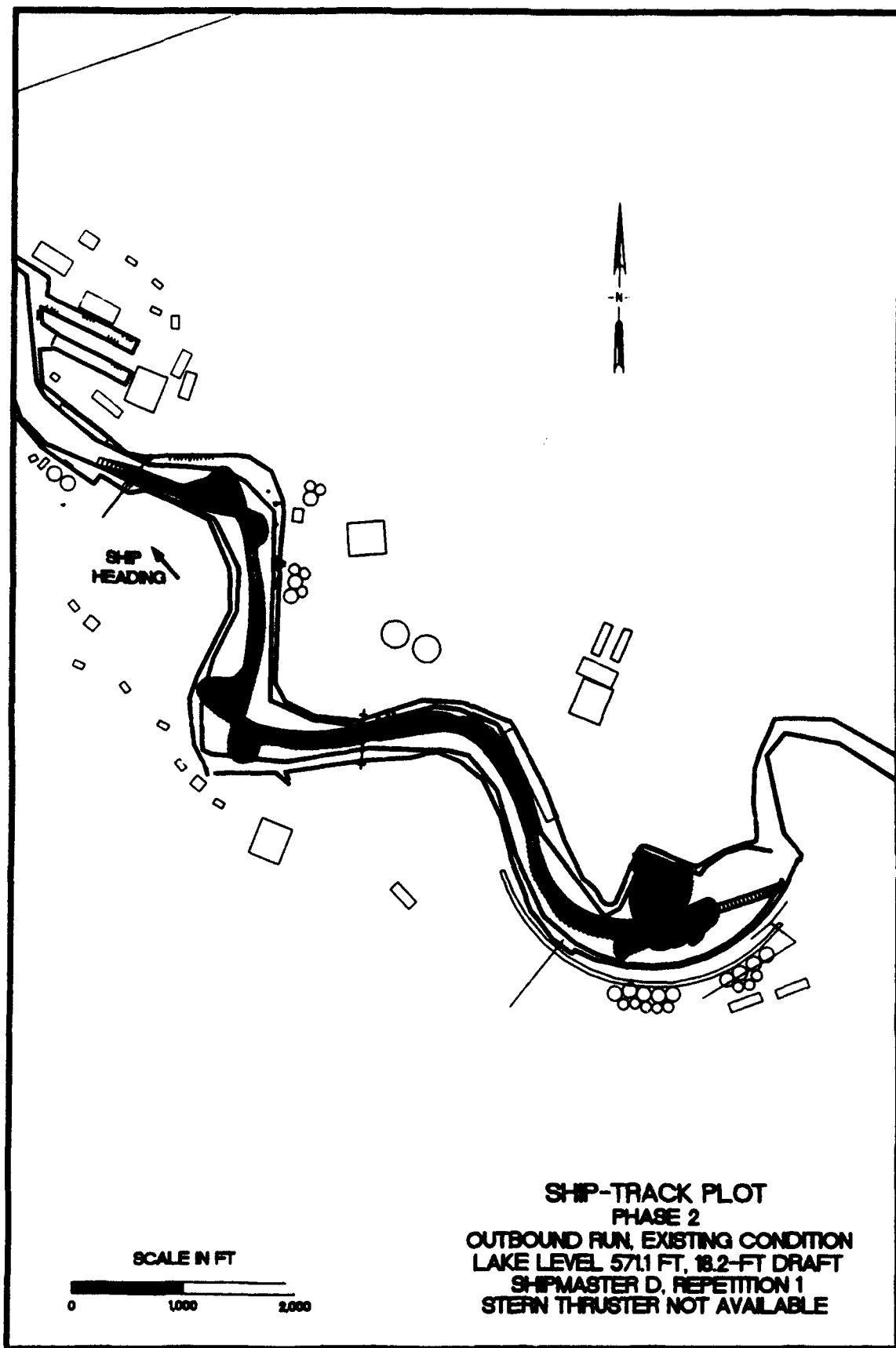


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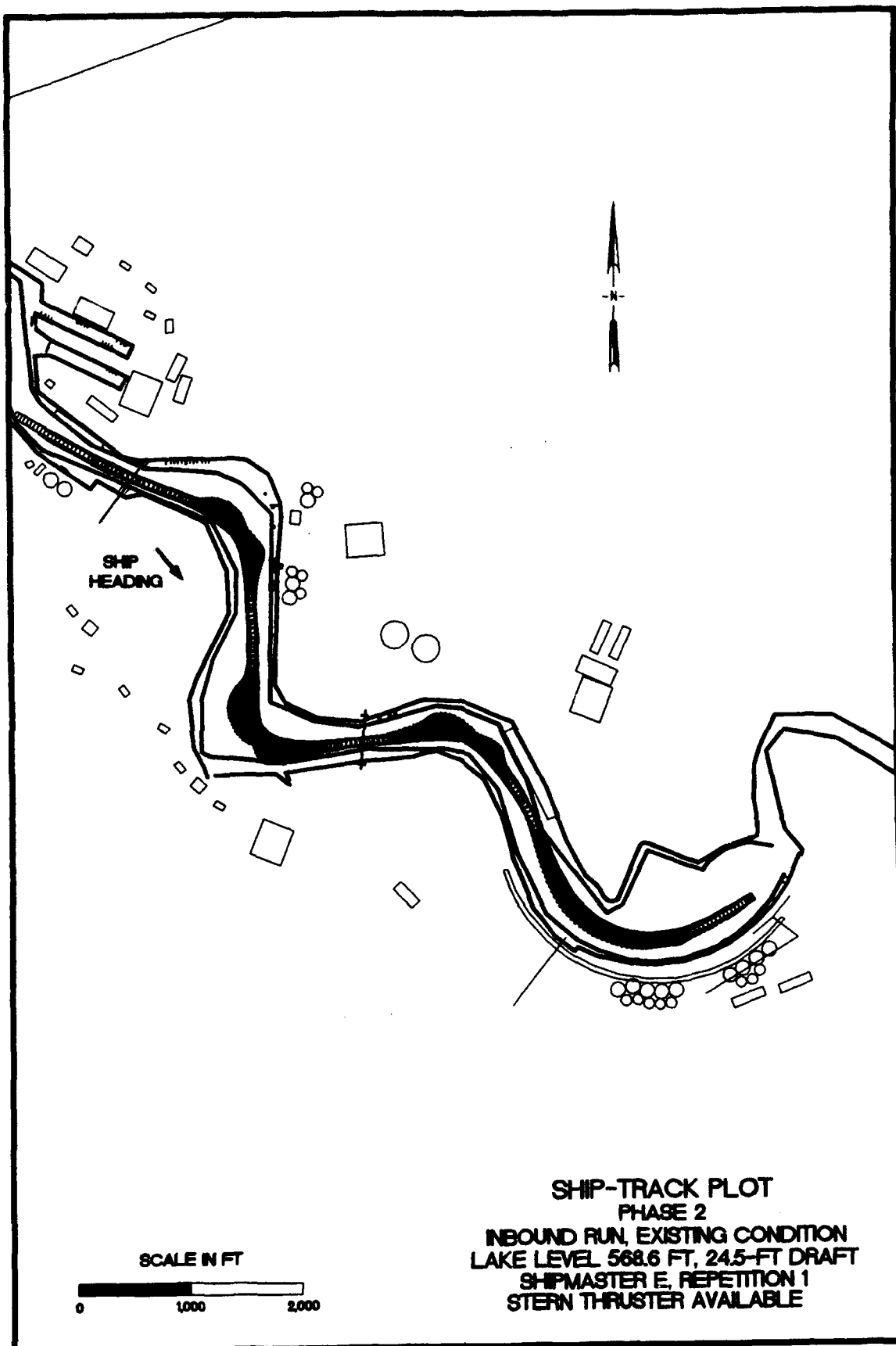
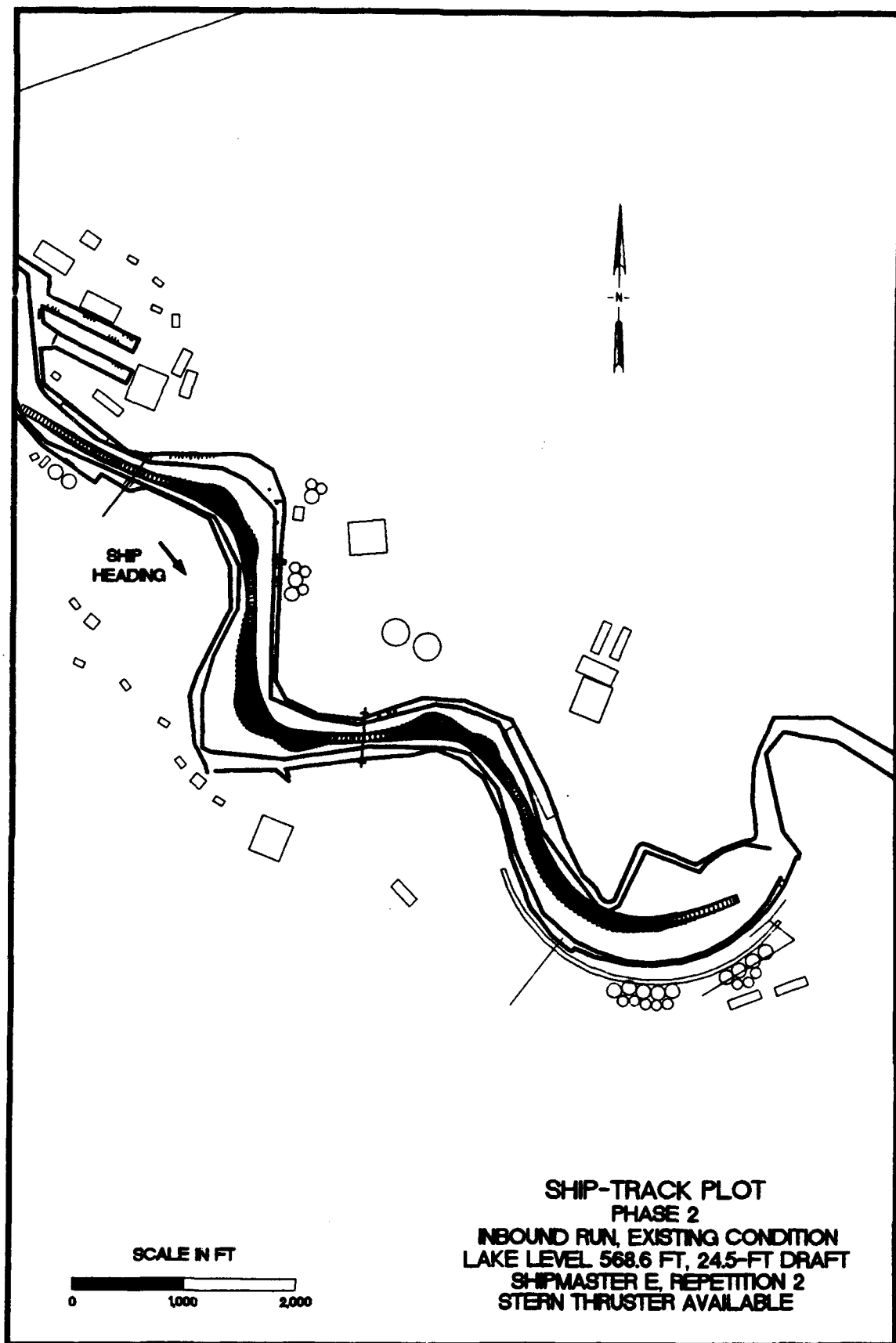


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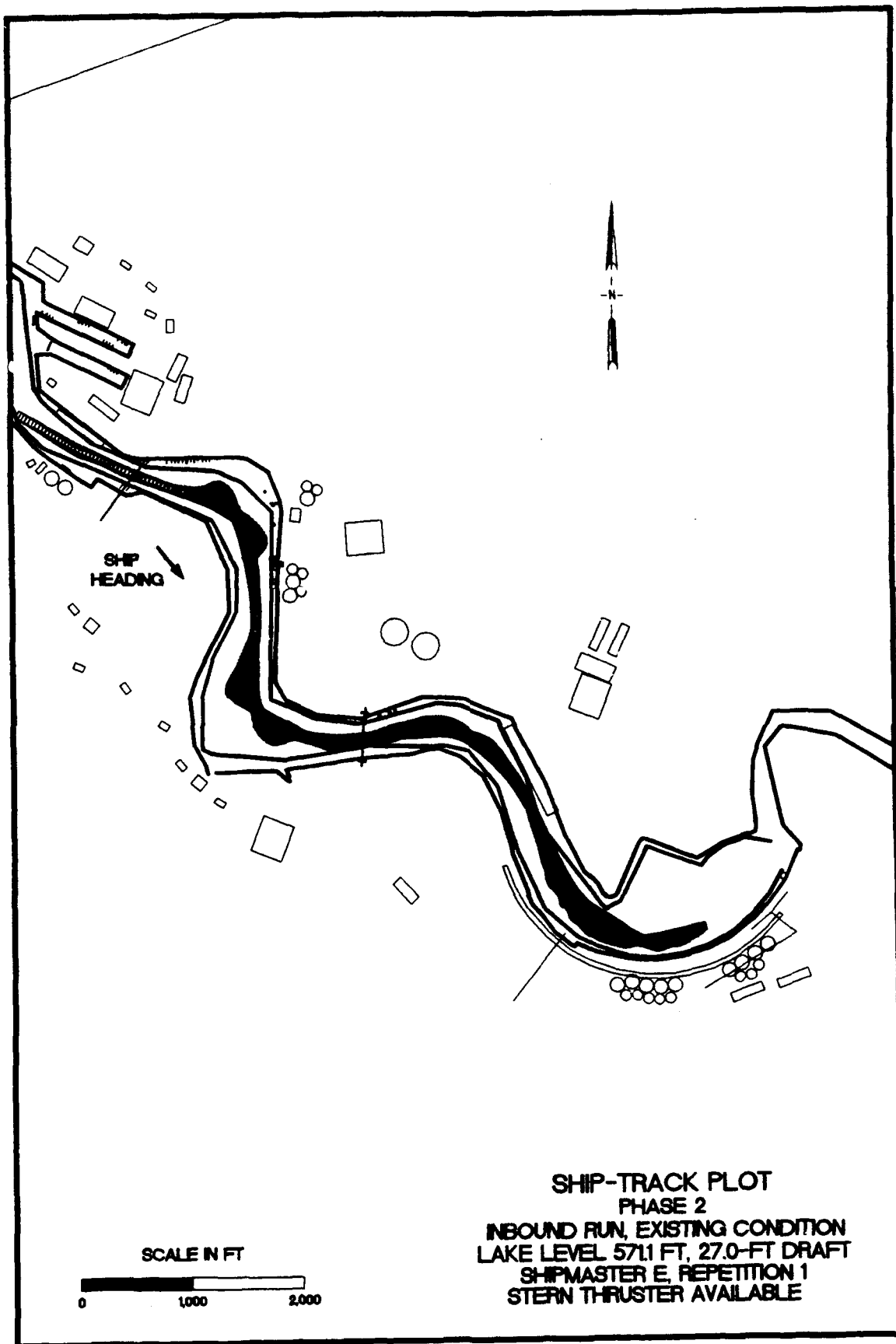
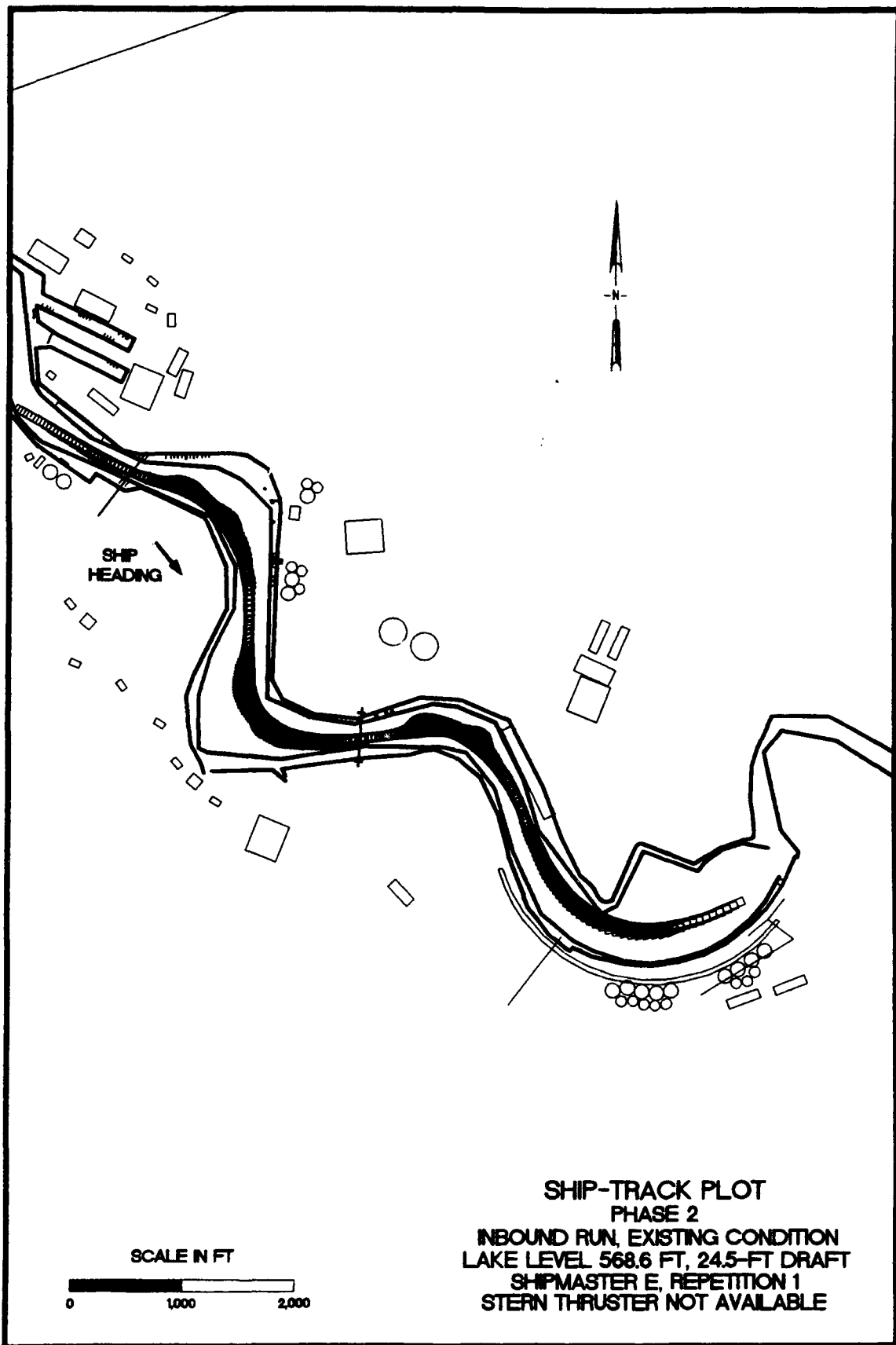


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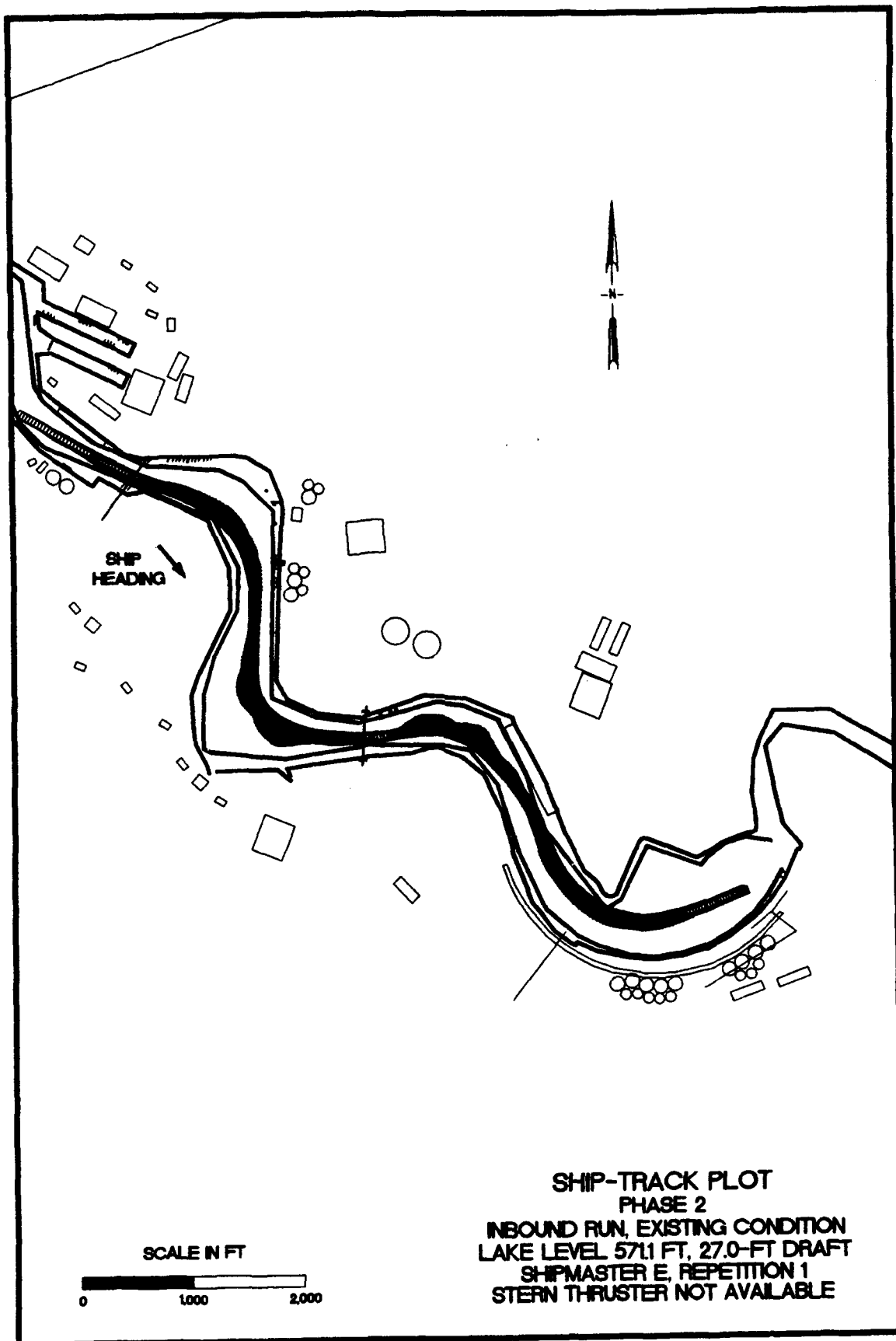
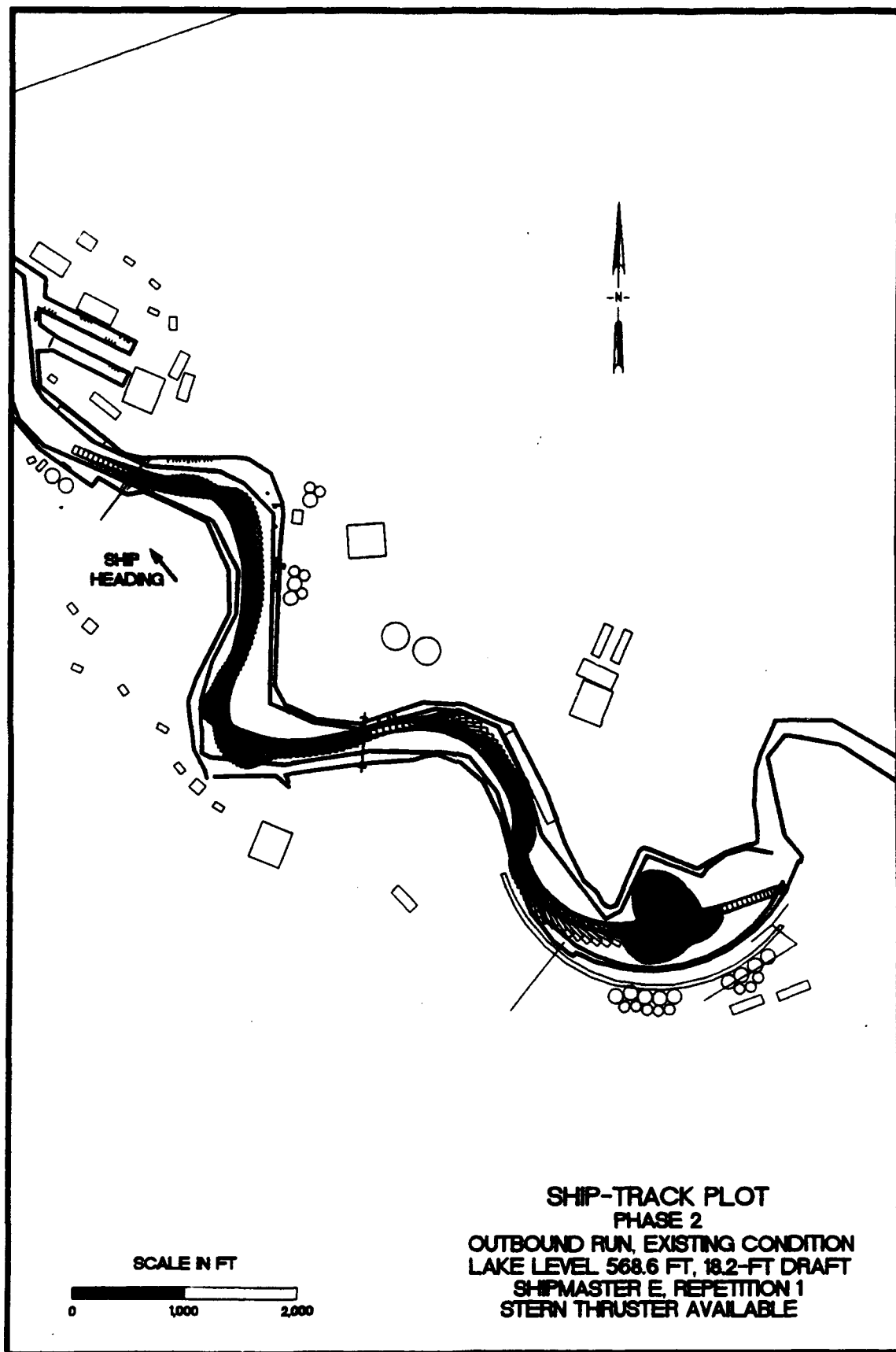


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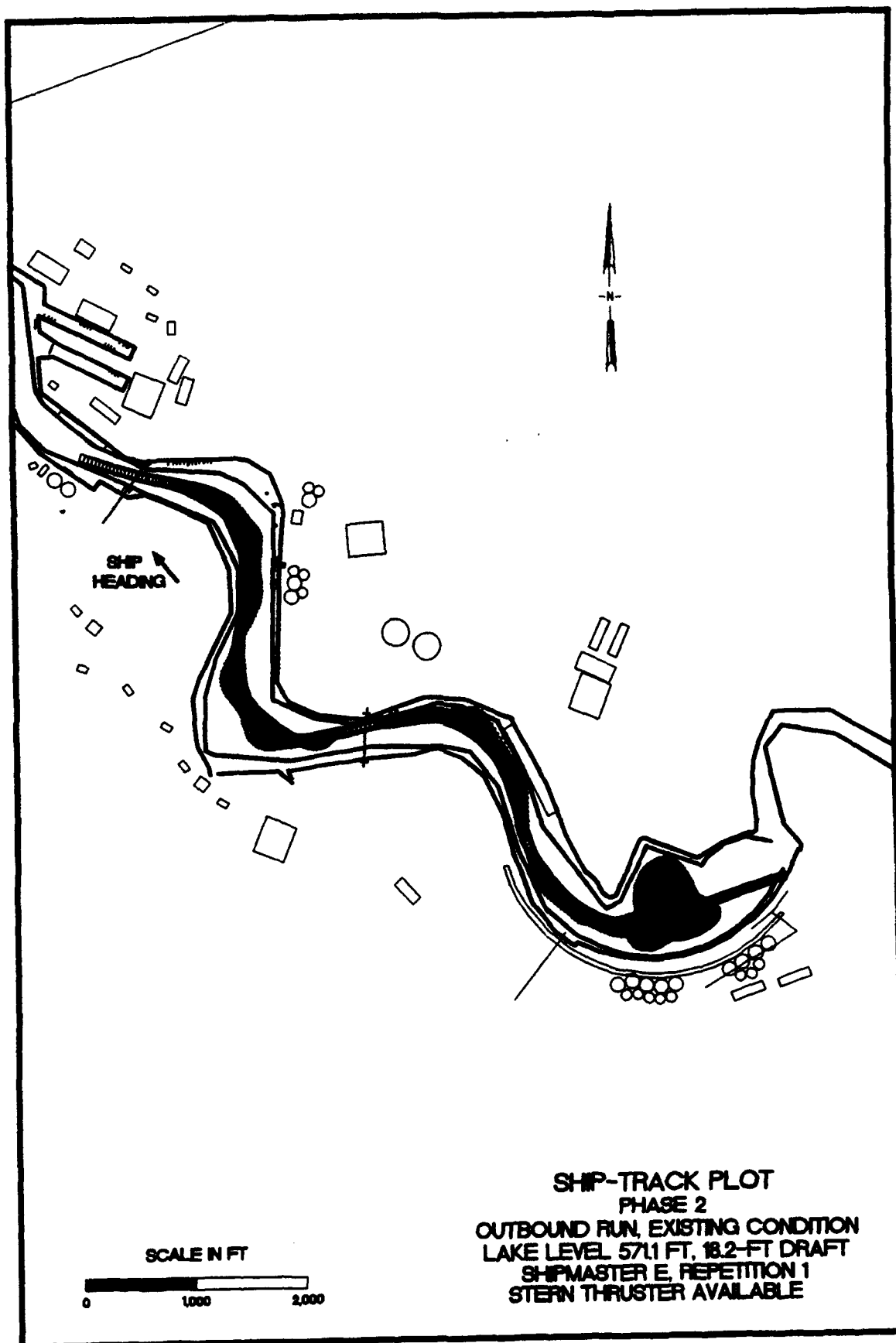
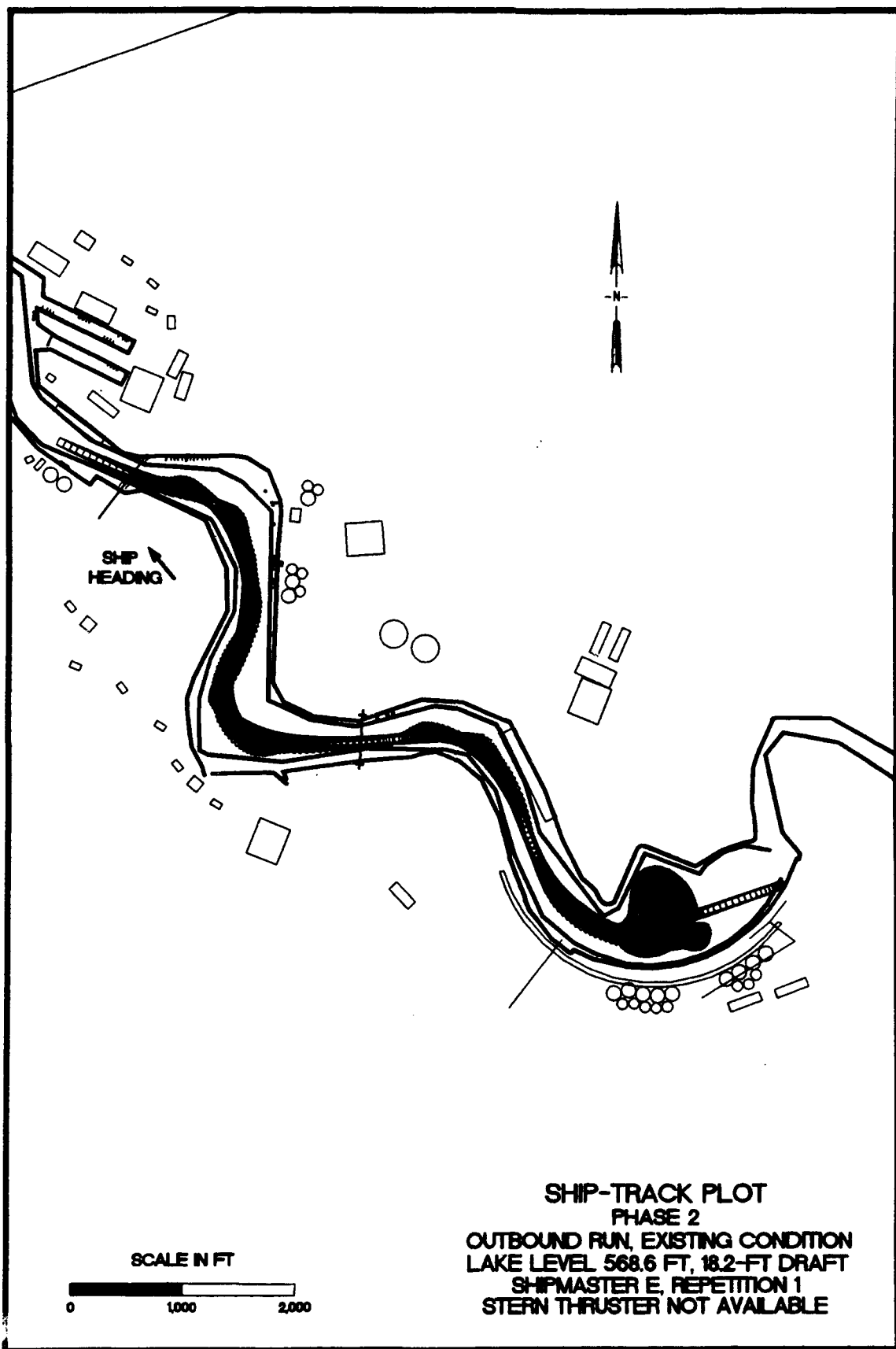


PLATE B42



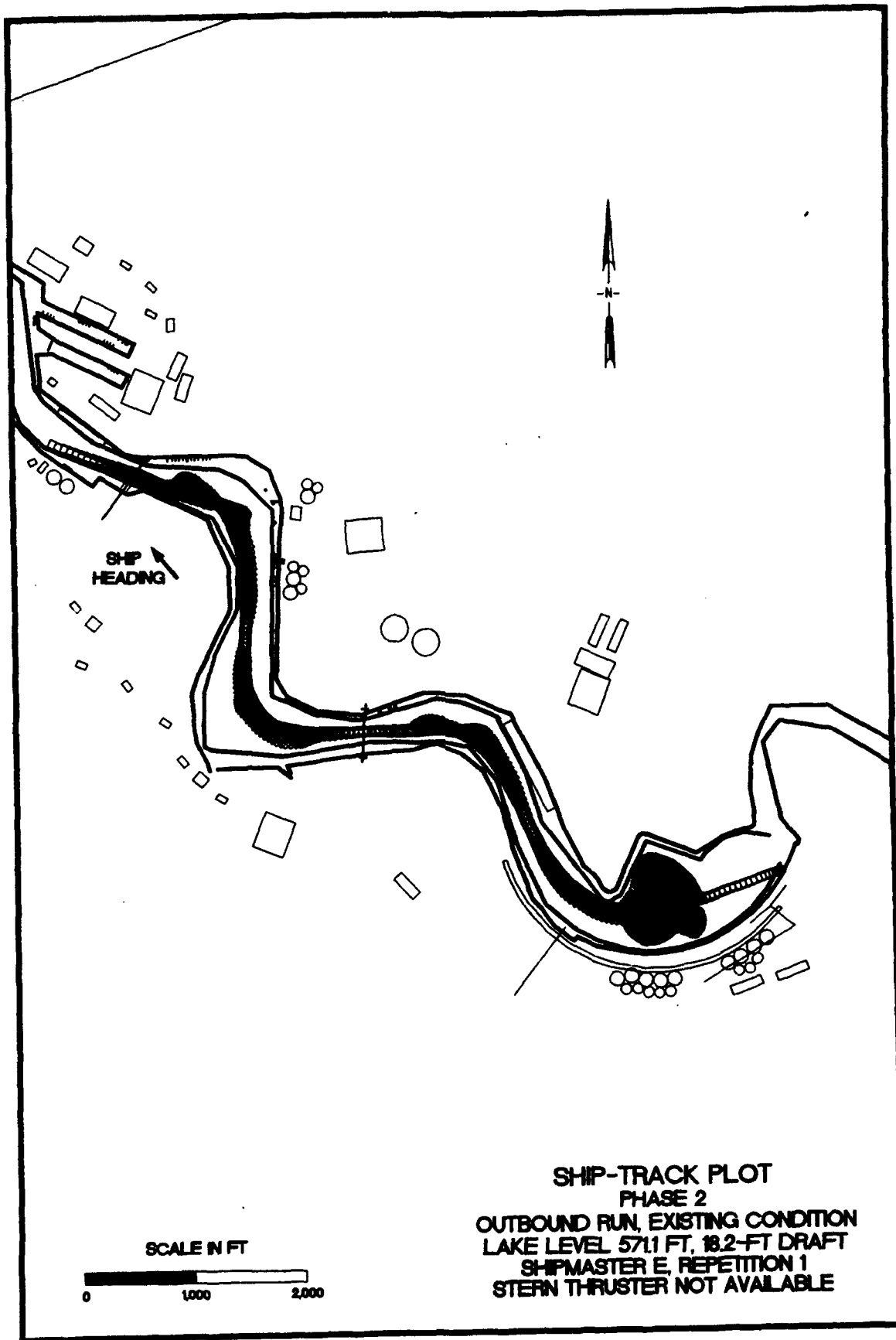
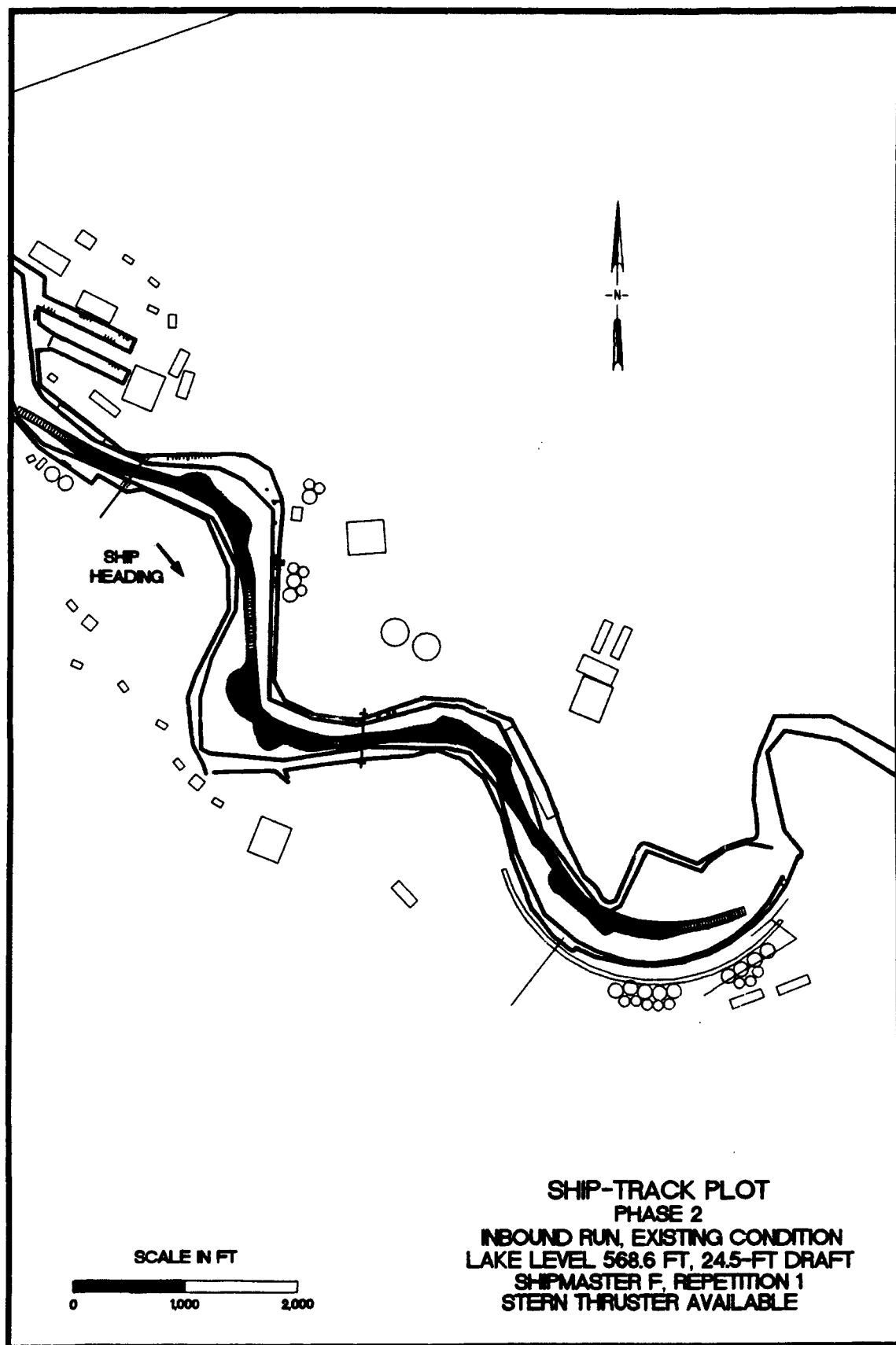


PLATE B44



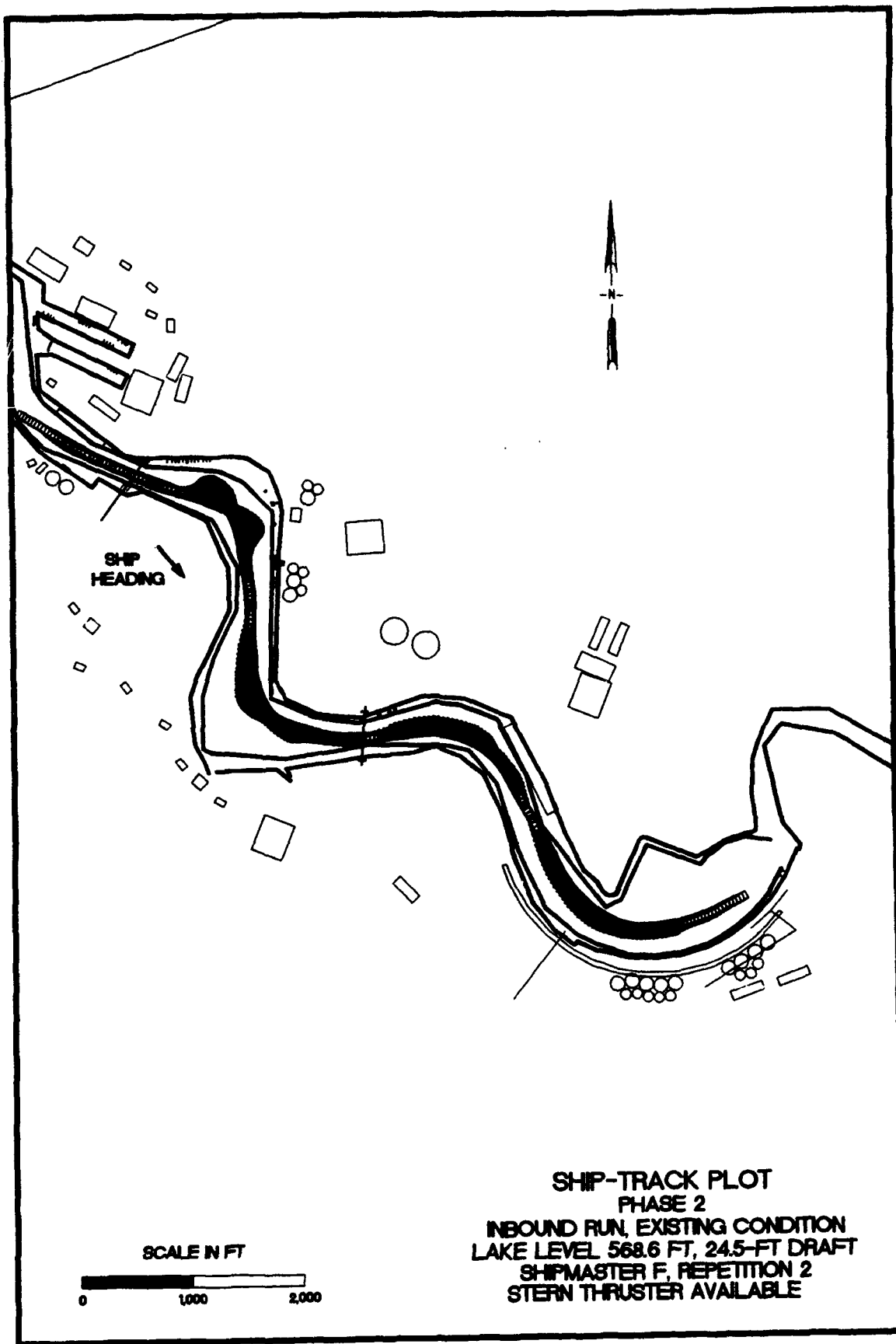
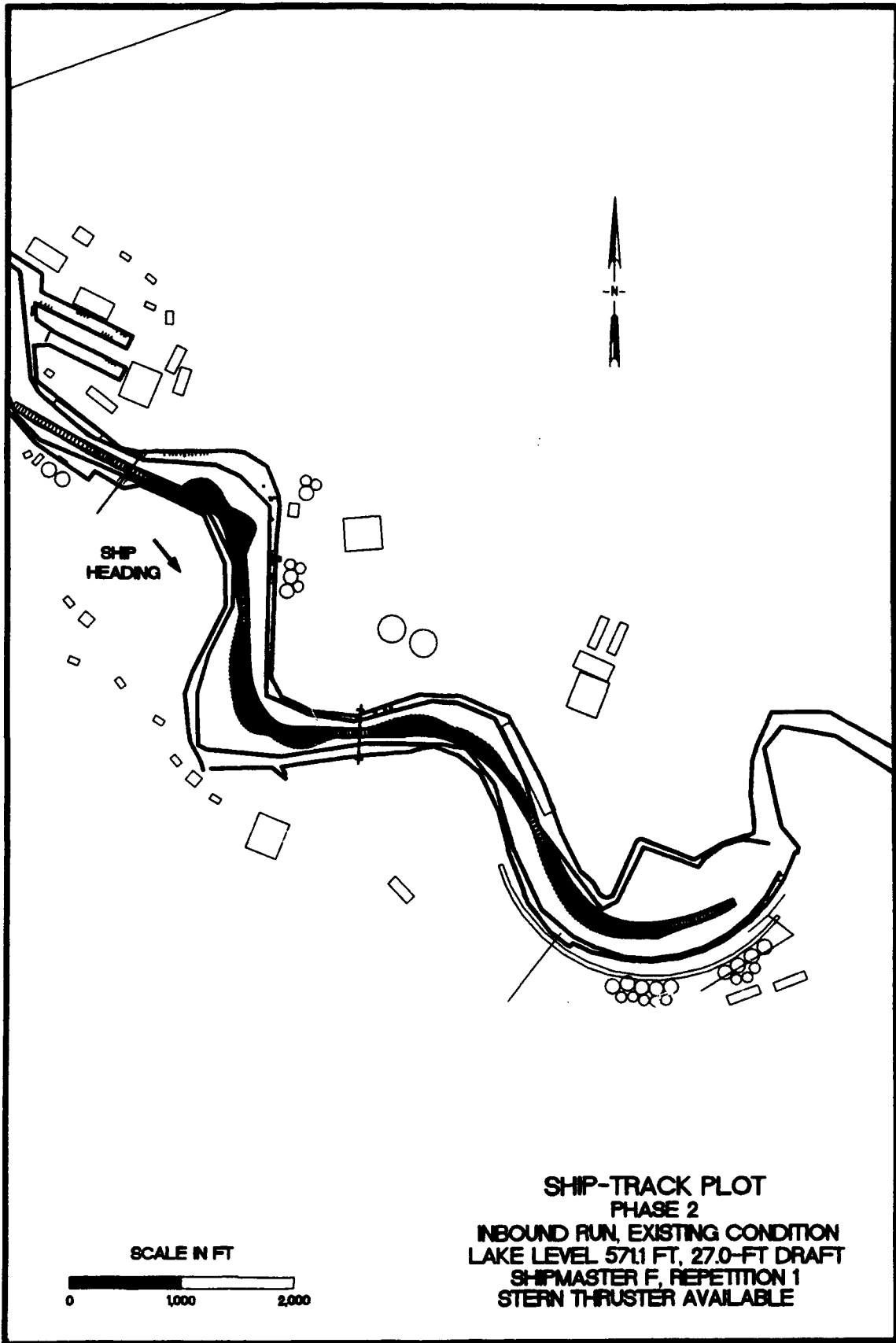


PLATE B46



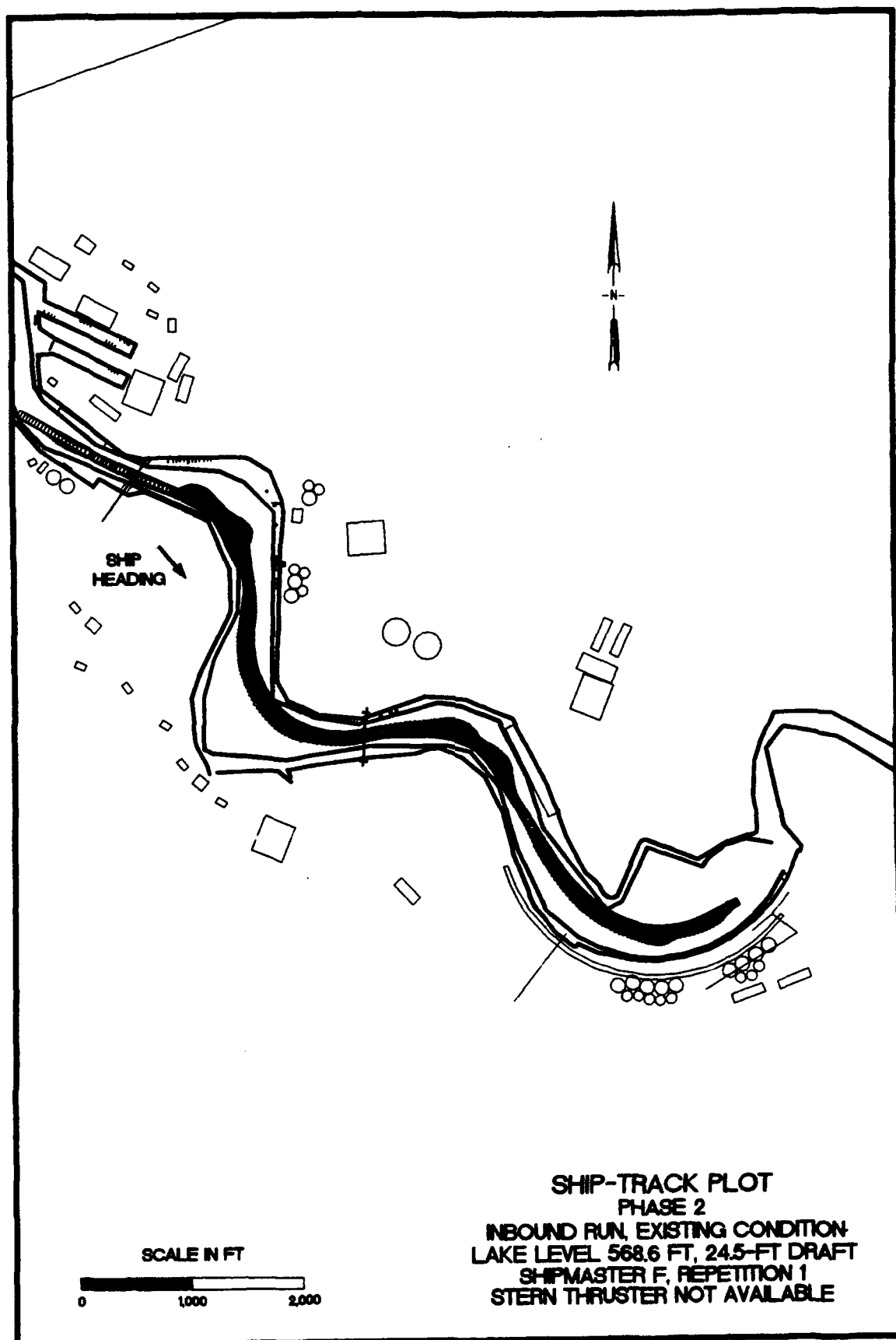
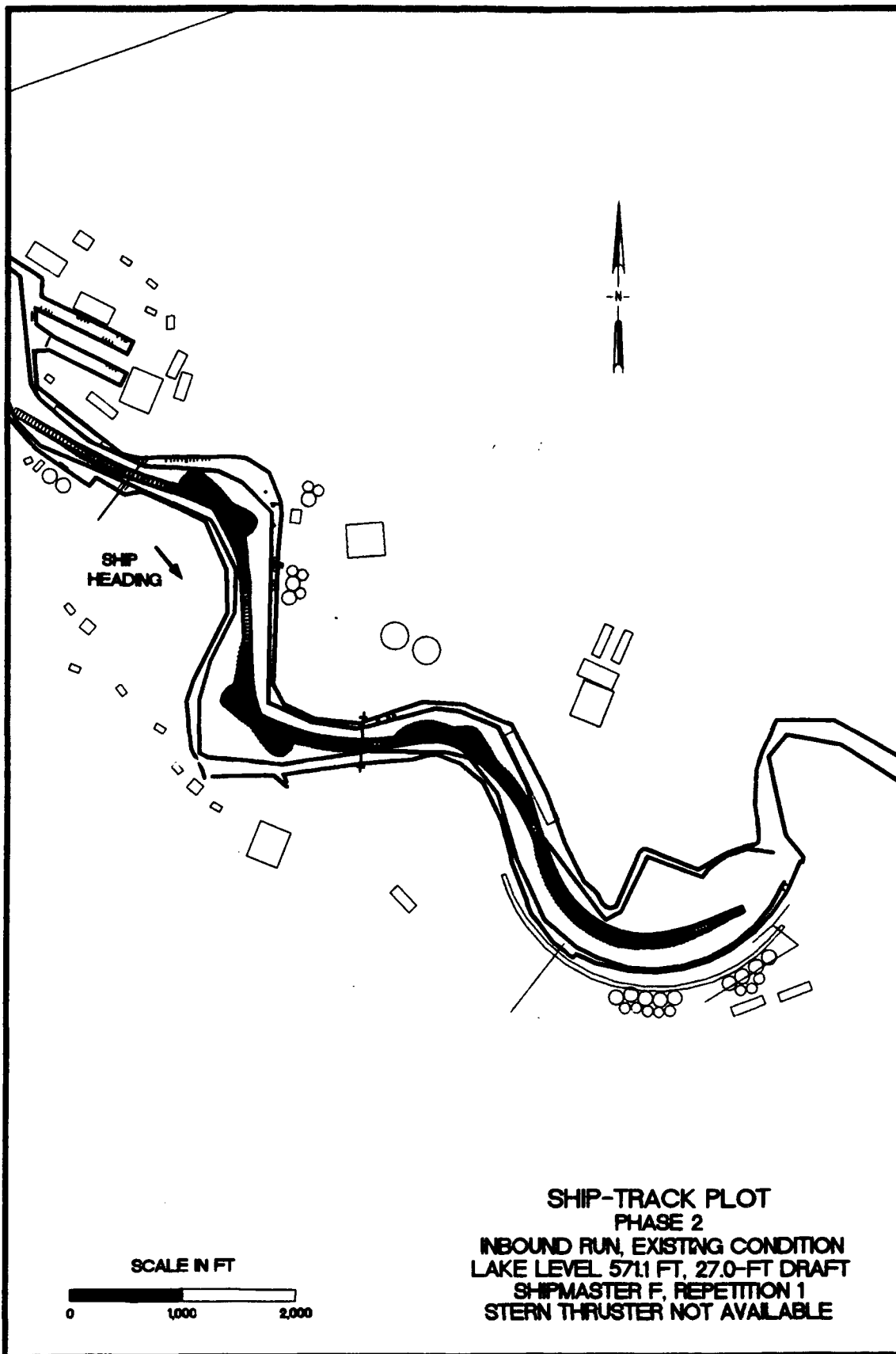


PLATE B48



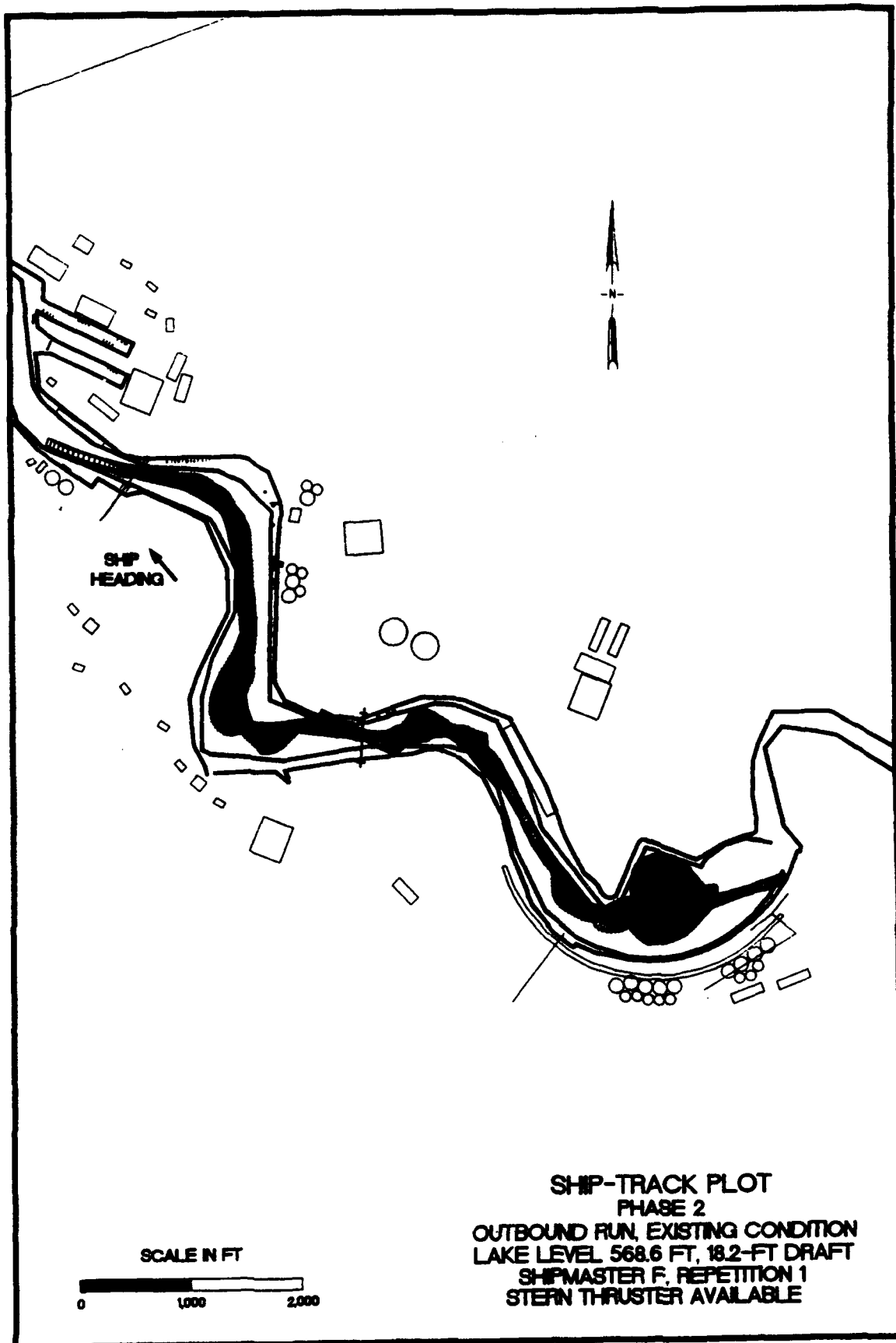


PLATE B50

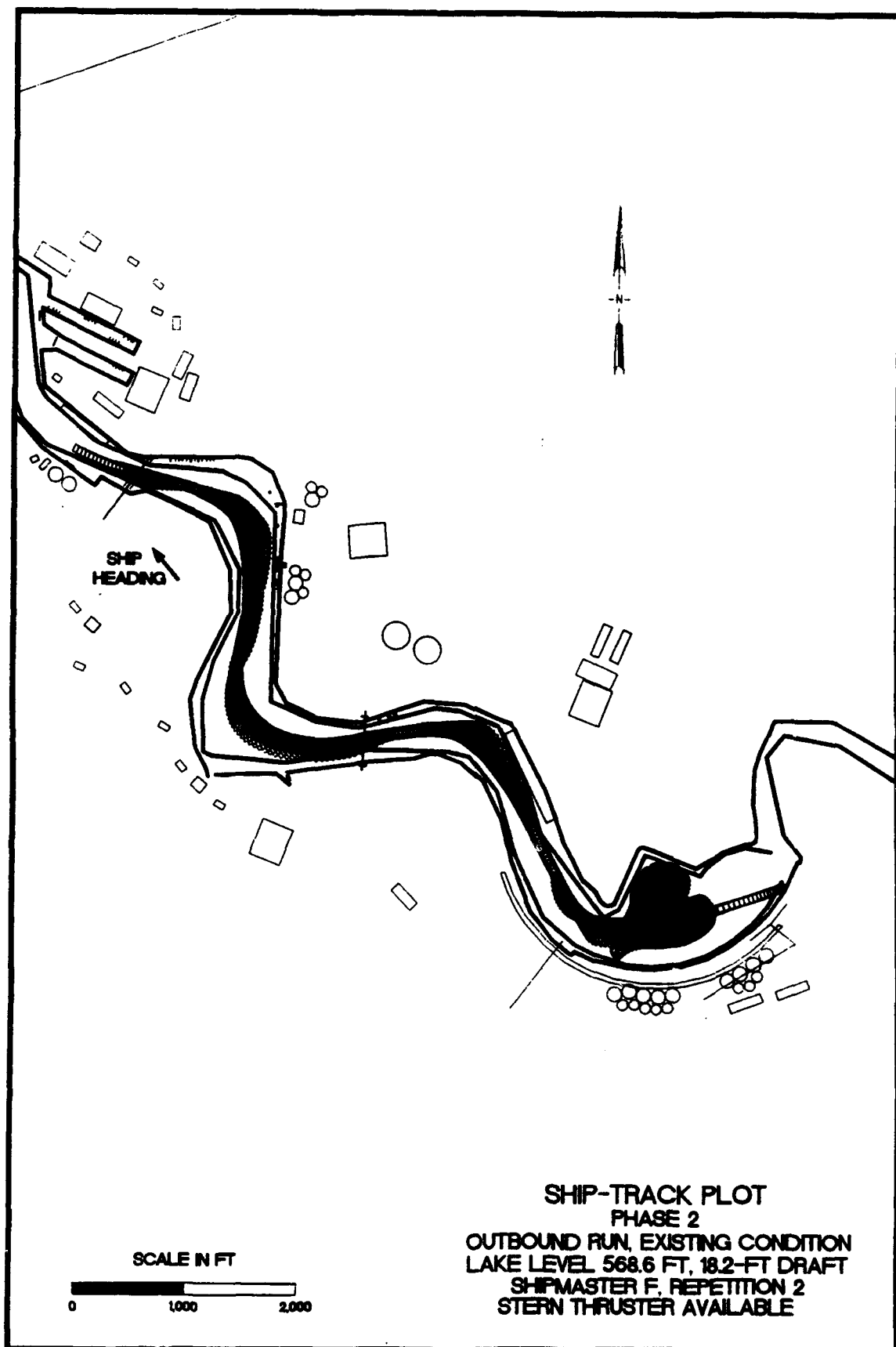


PLATE B51

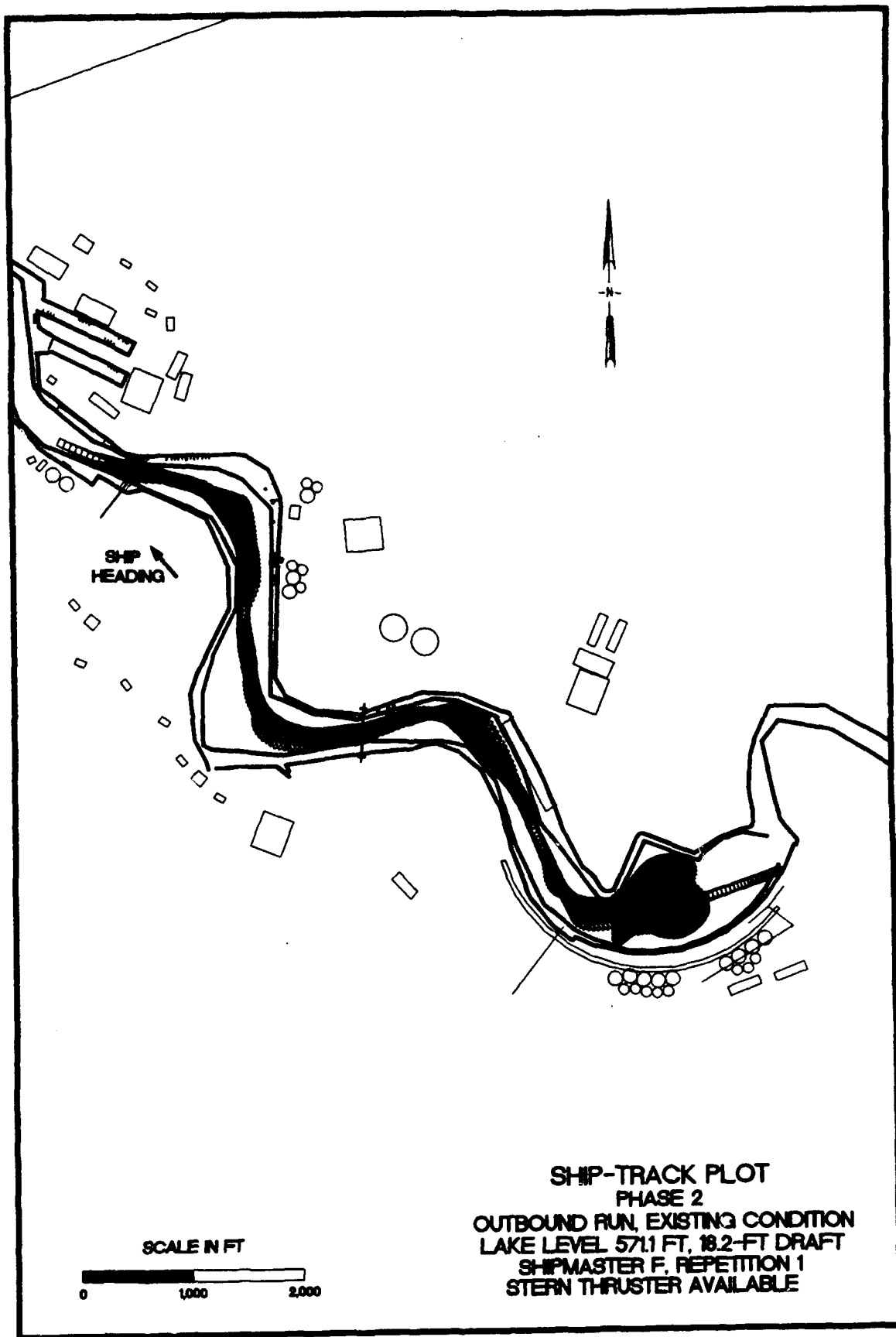
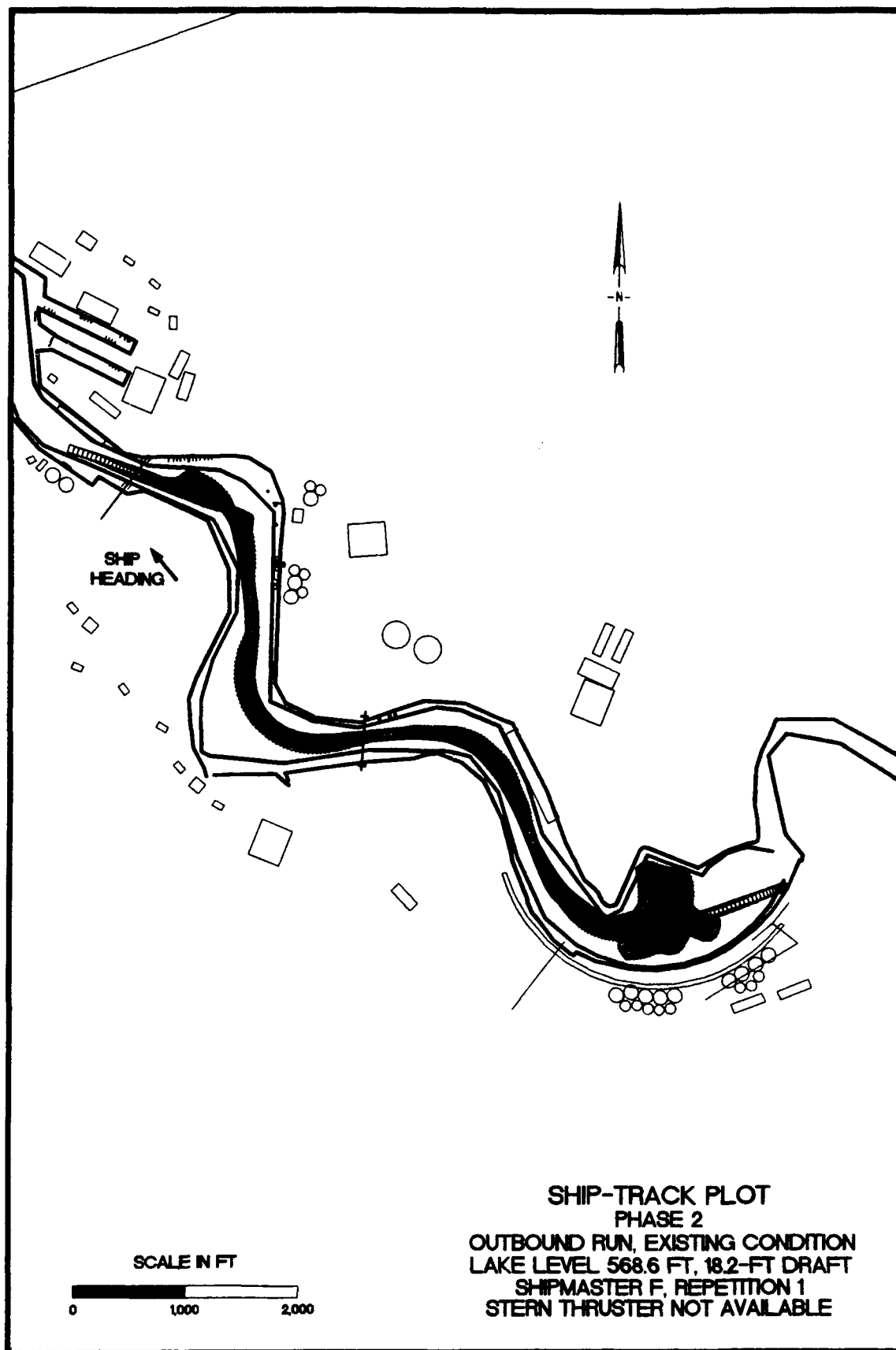


PLATE B52



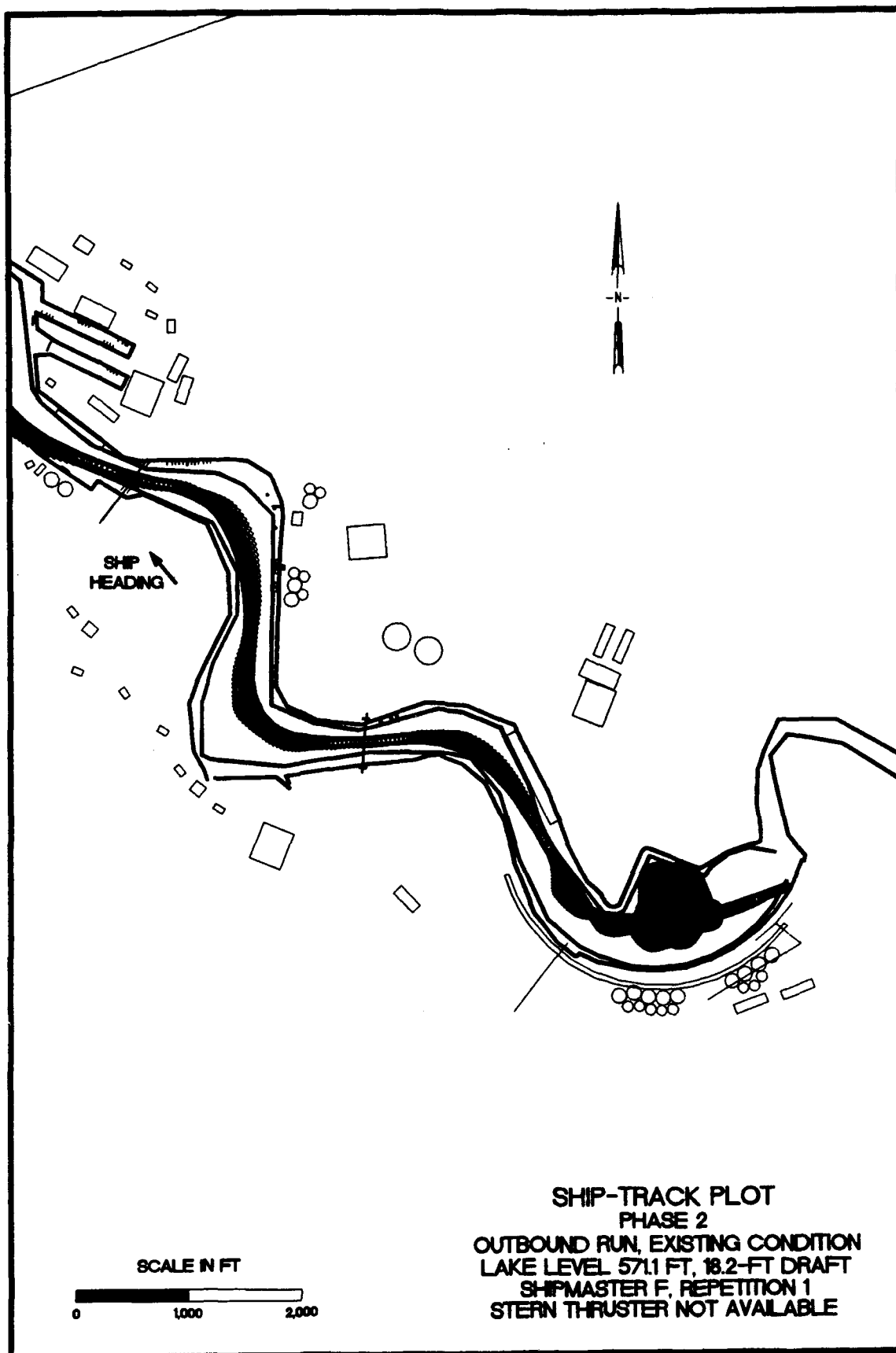
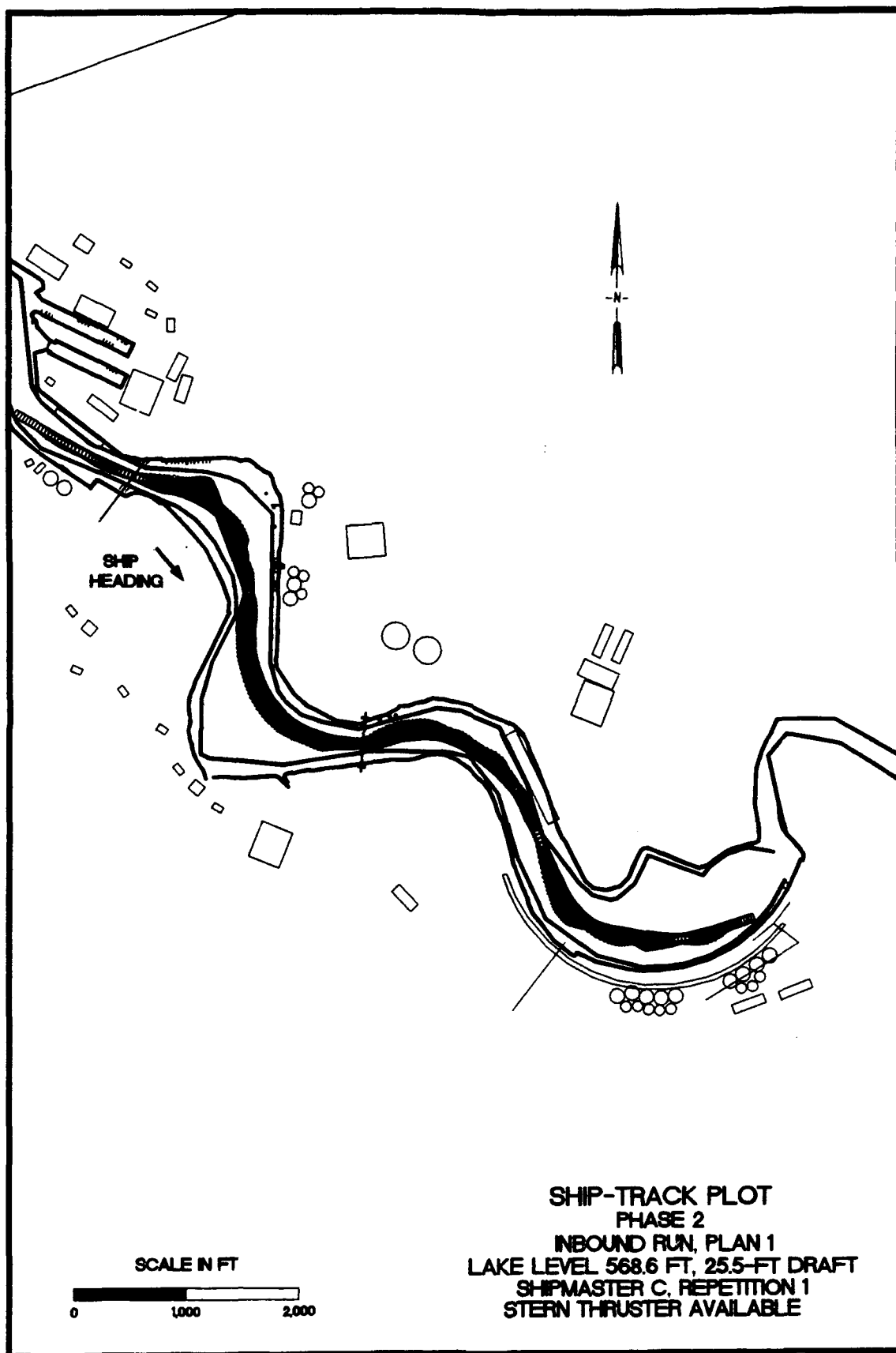


PLATE B54



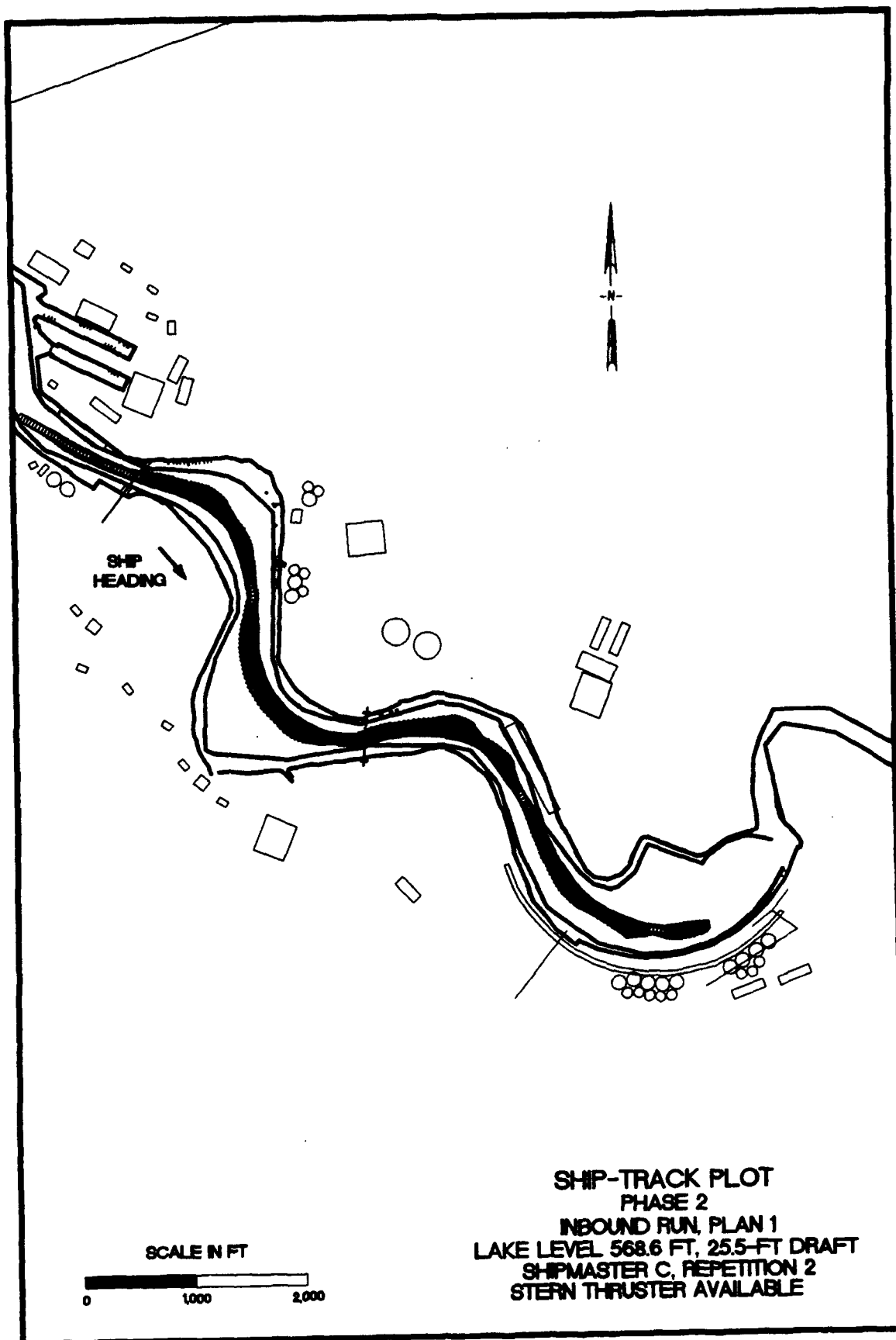
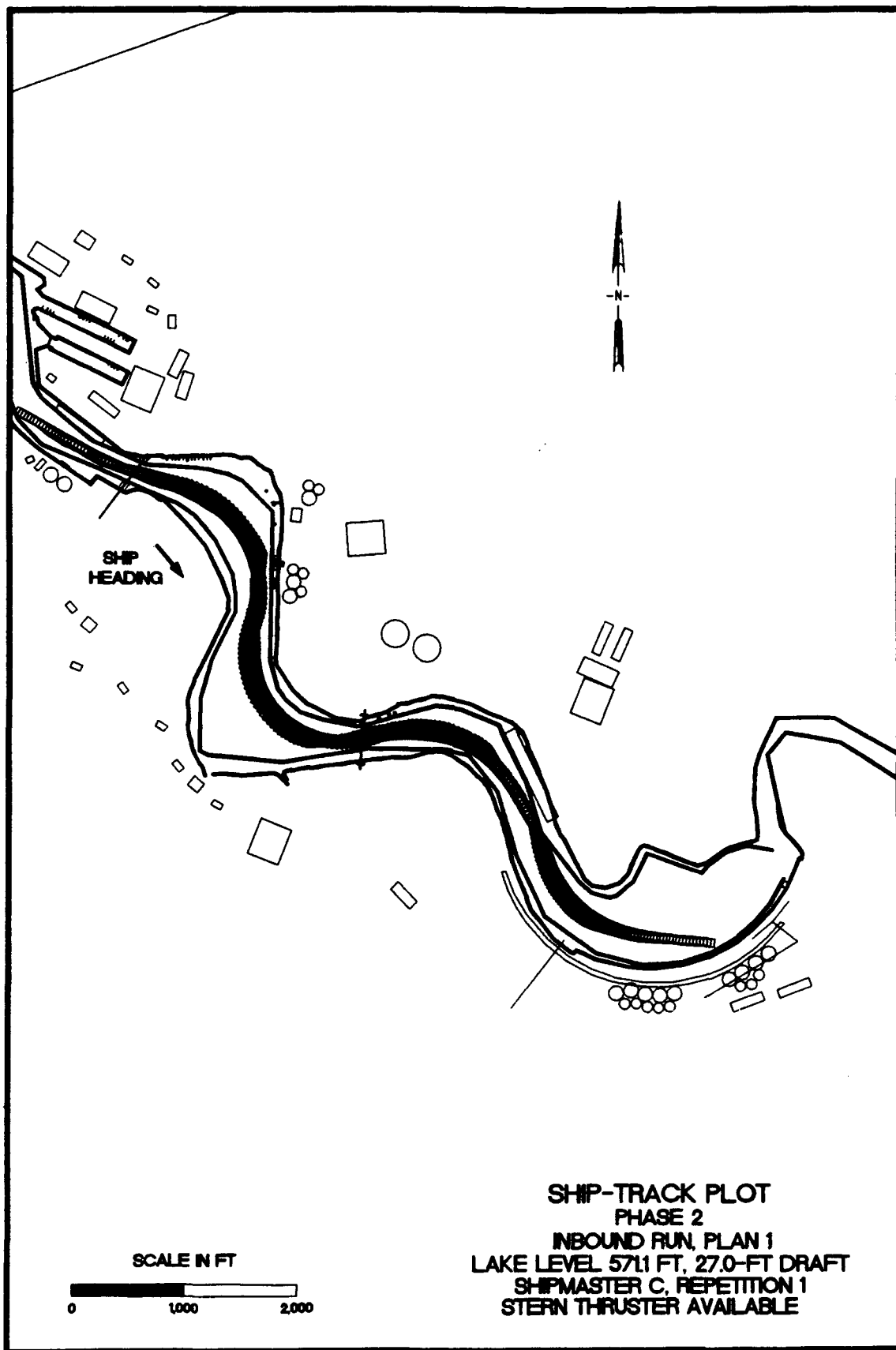


PLATE B56



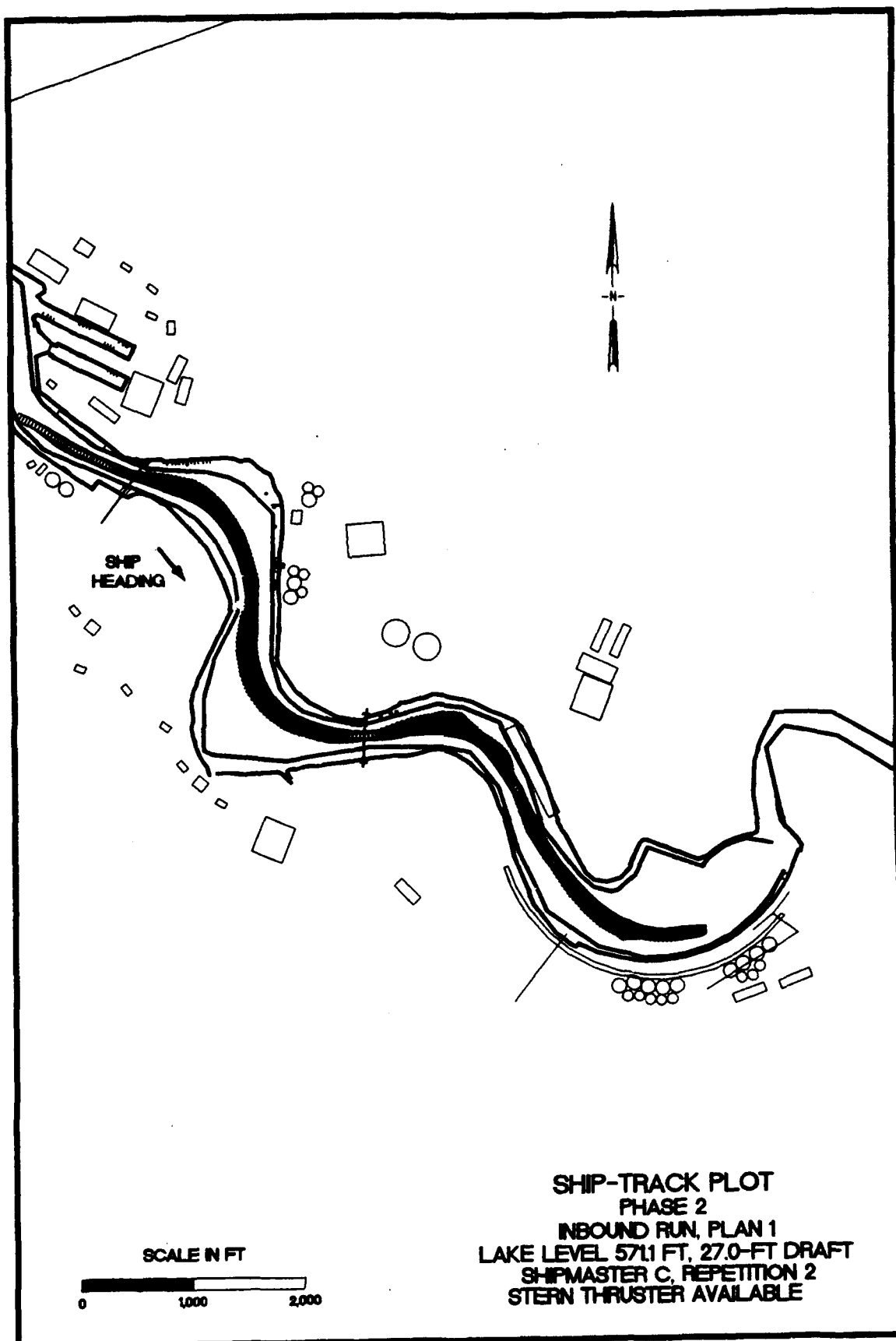
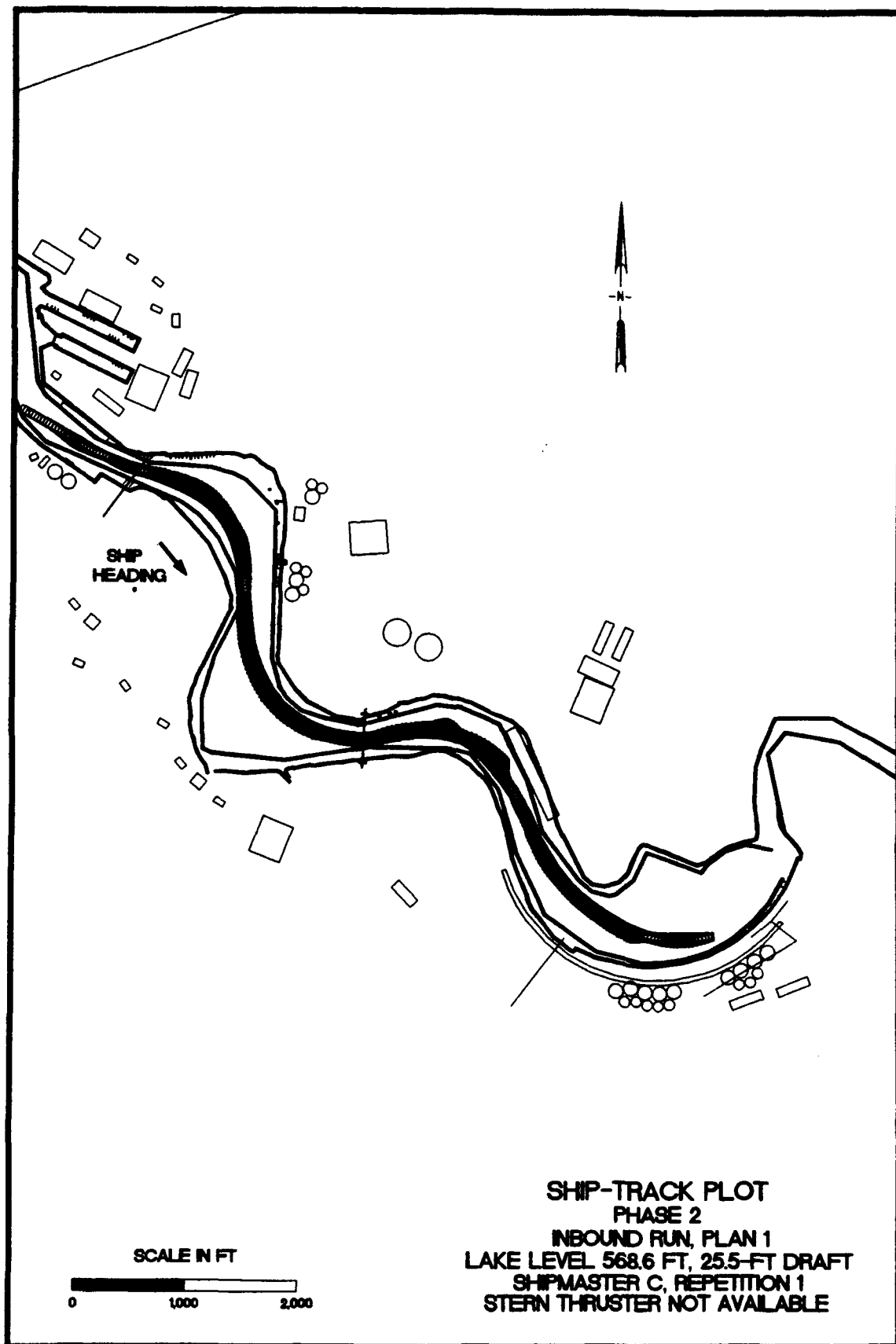


PLATE B58



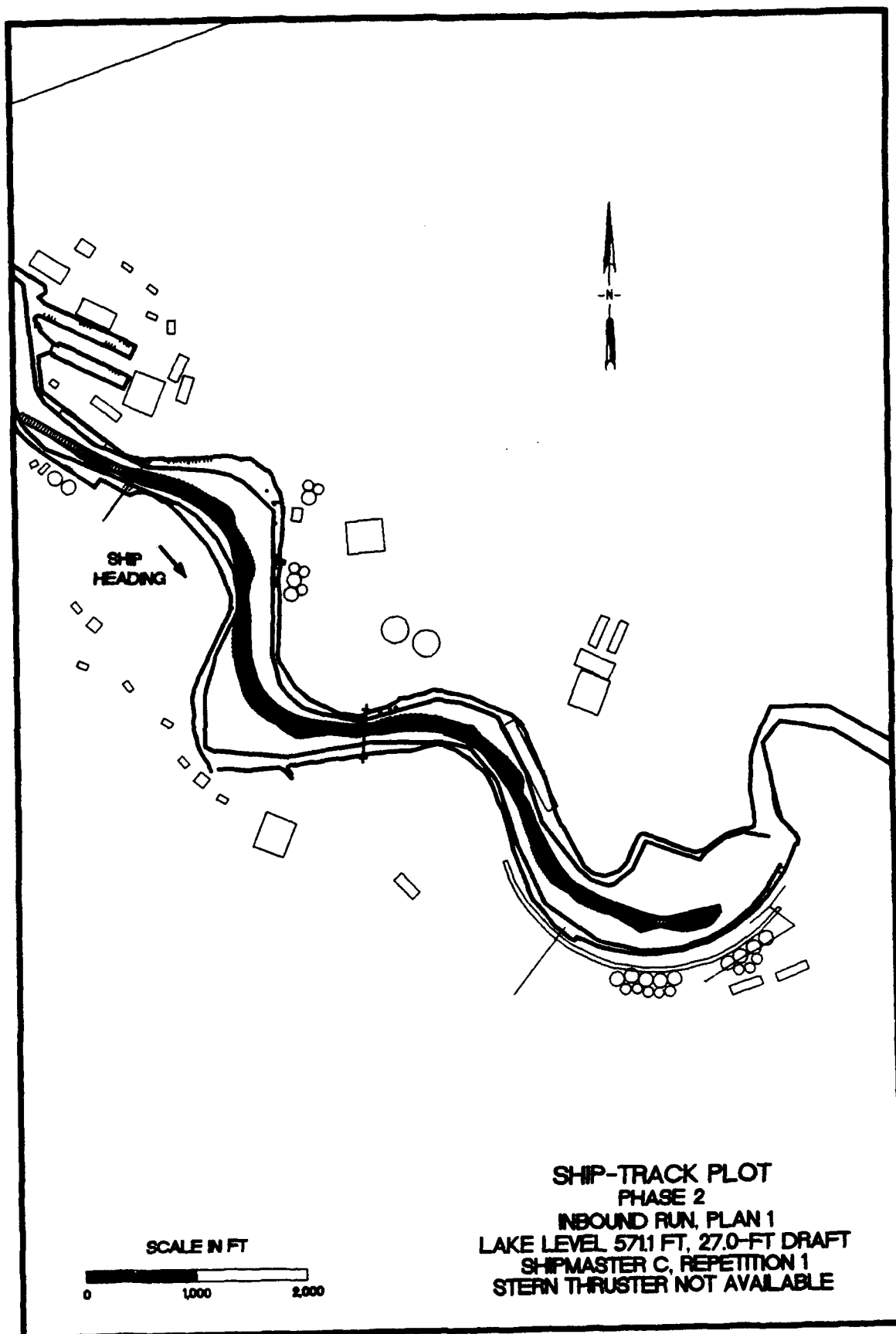
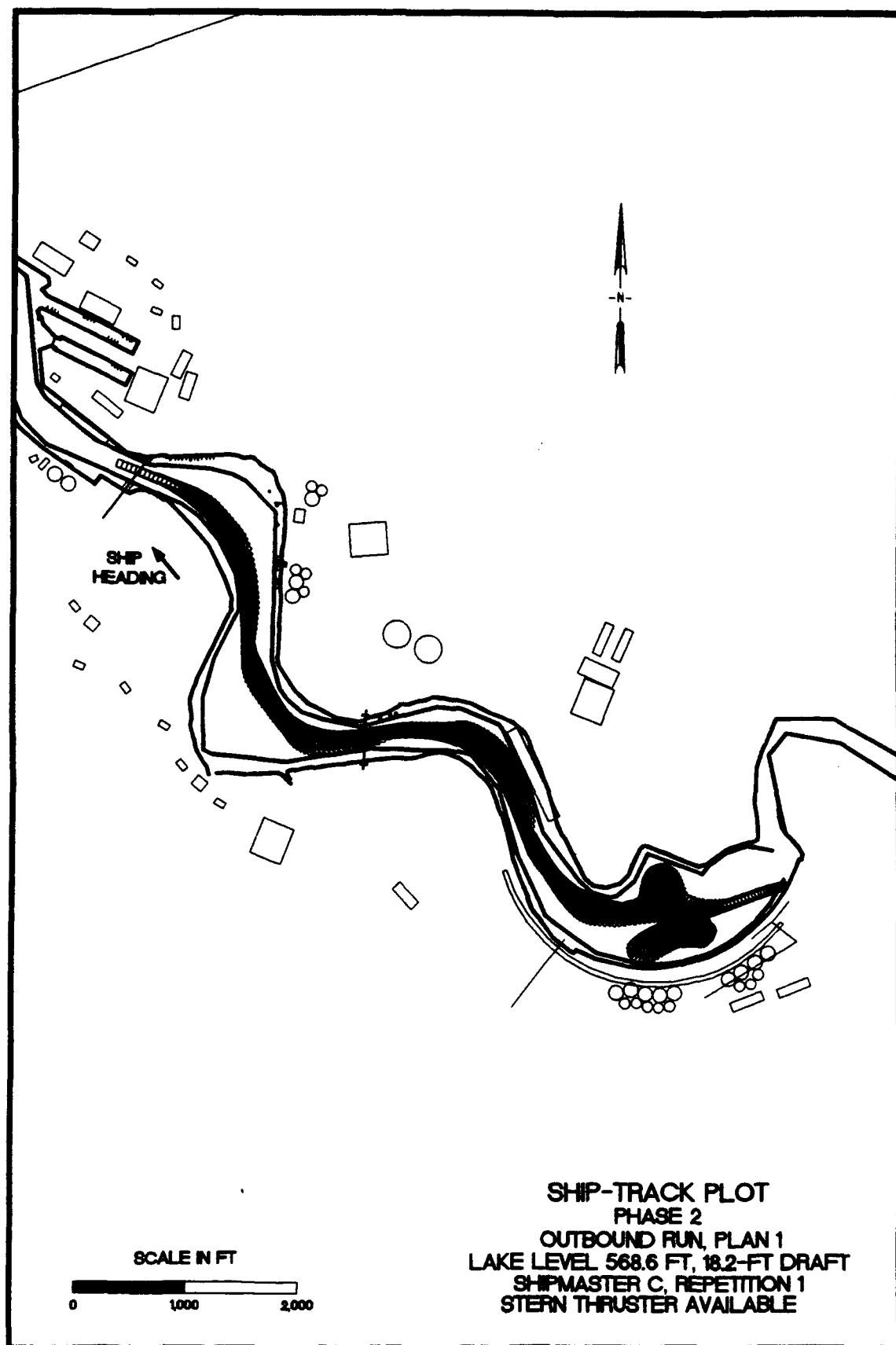


PLATE B60



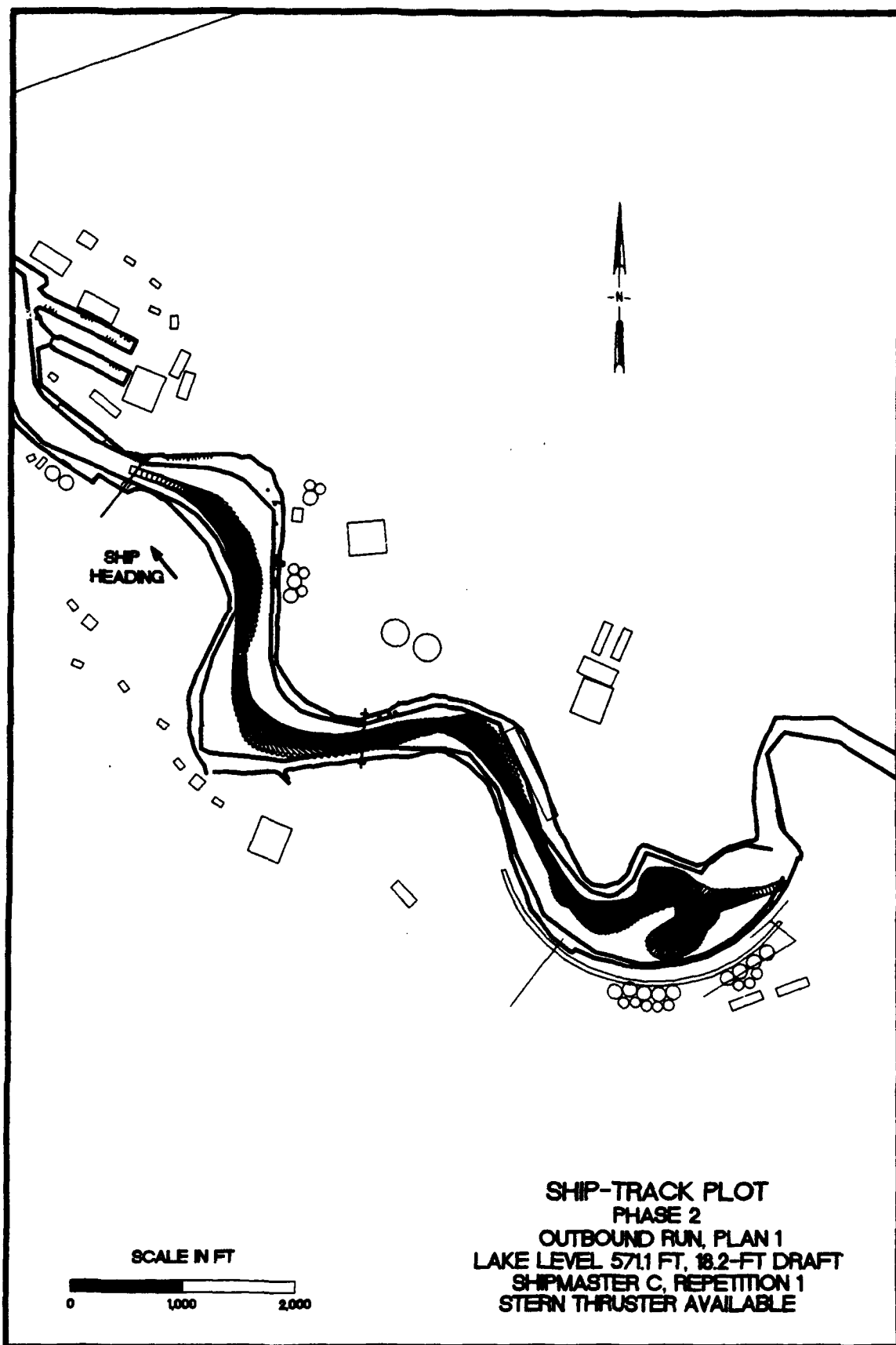


PLATE B62

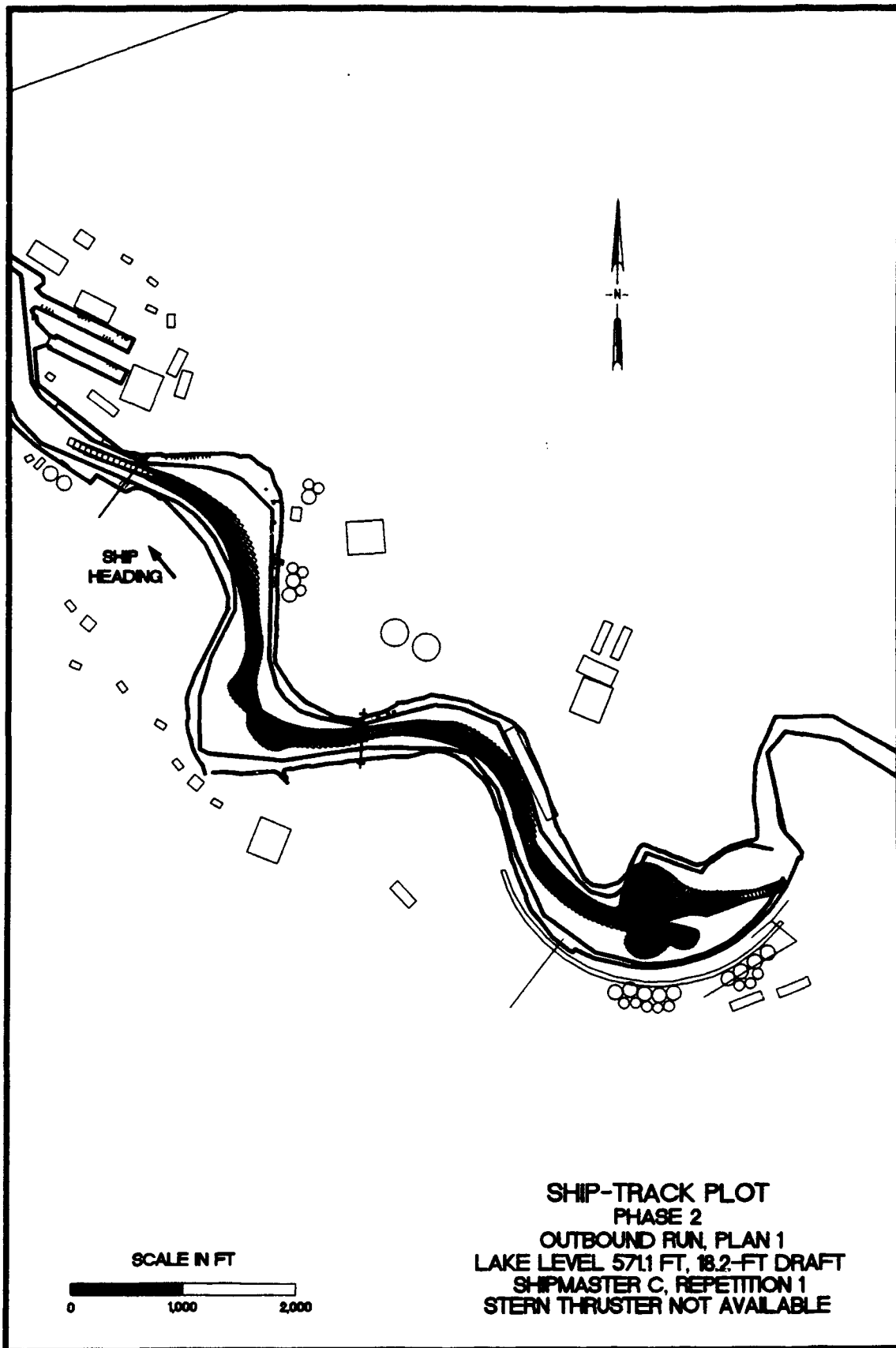


PLATE B63

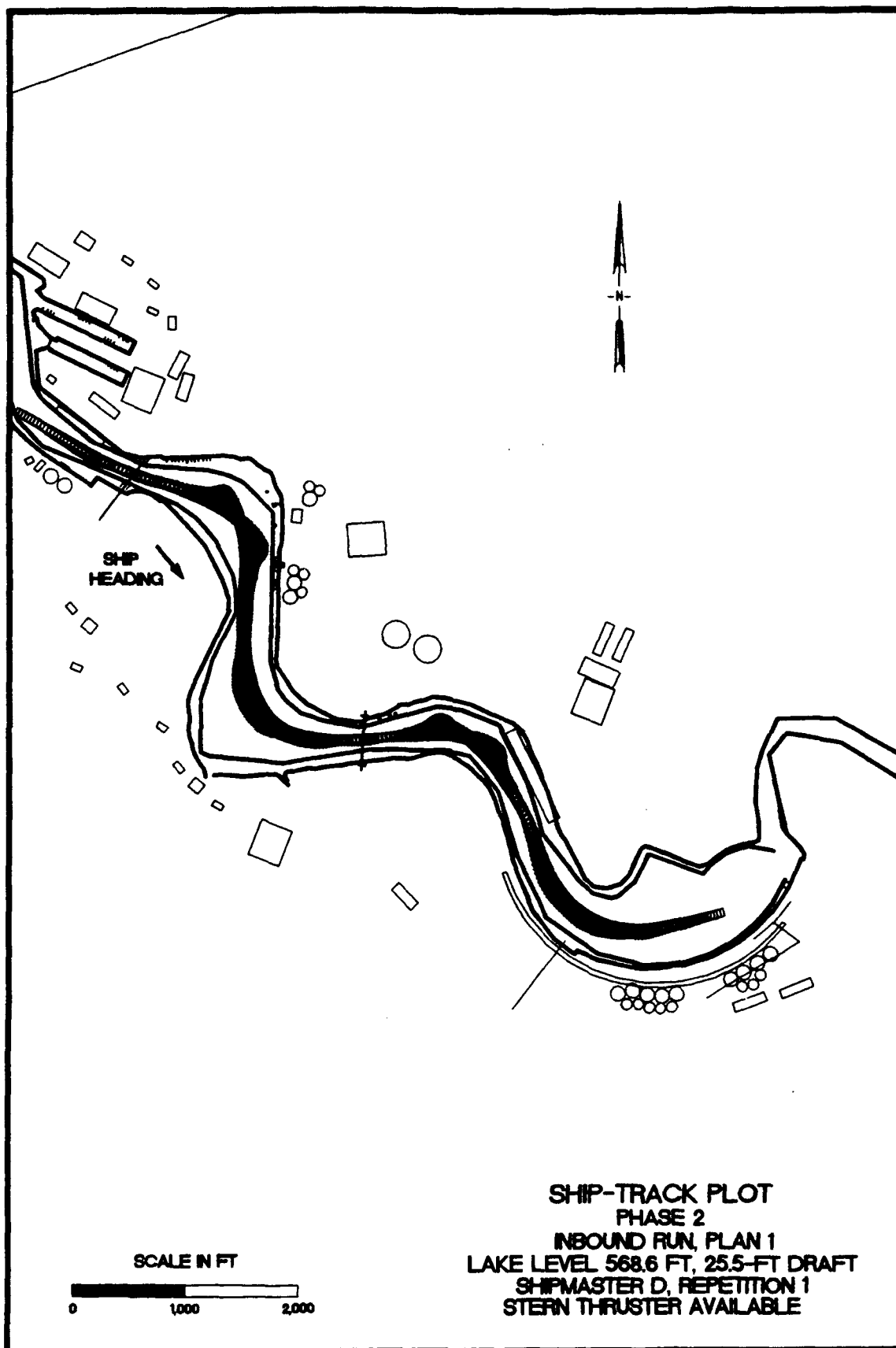
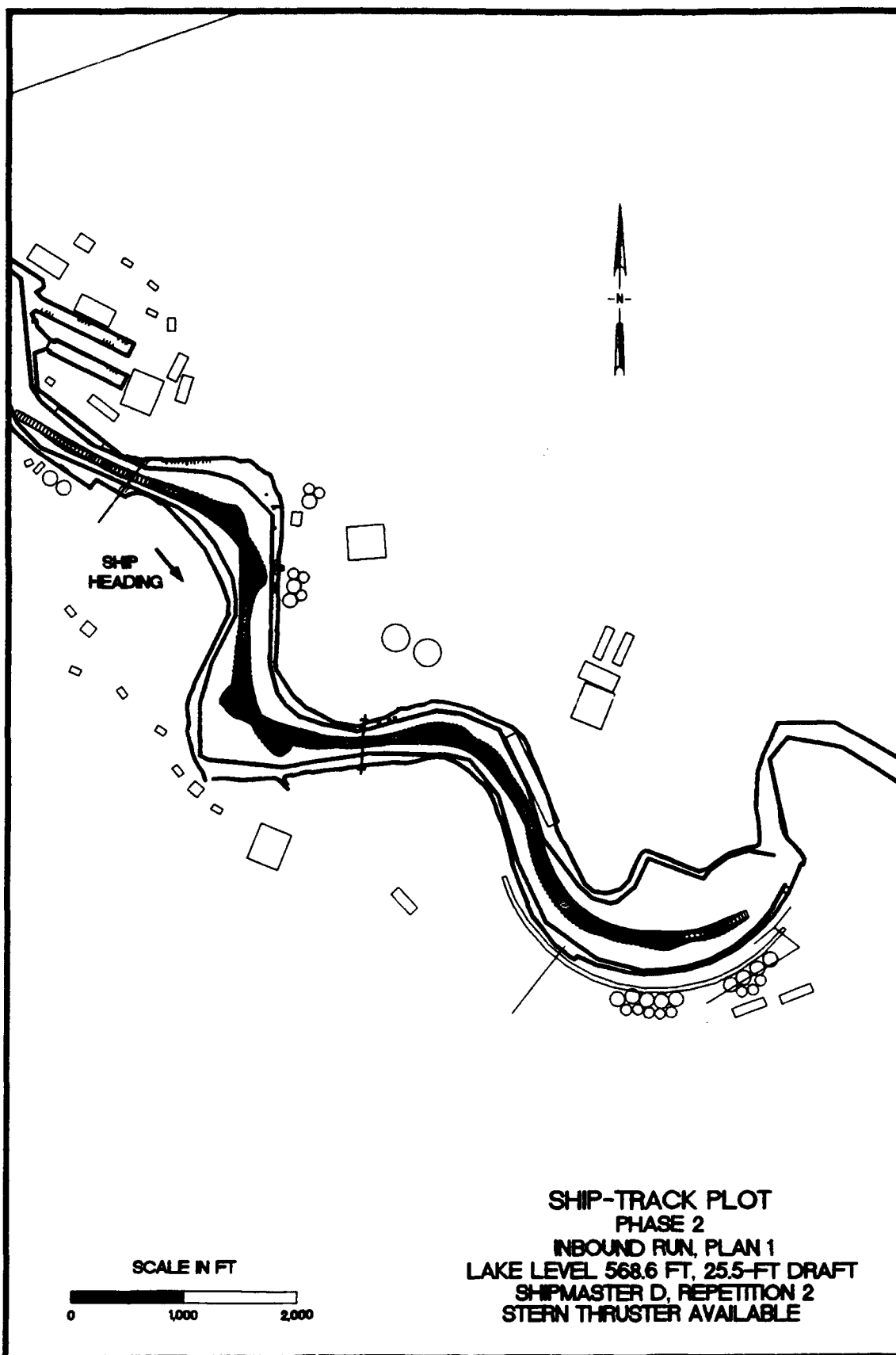


PLATE B64



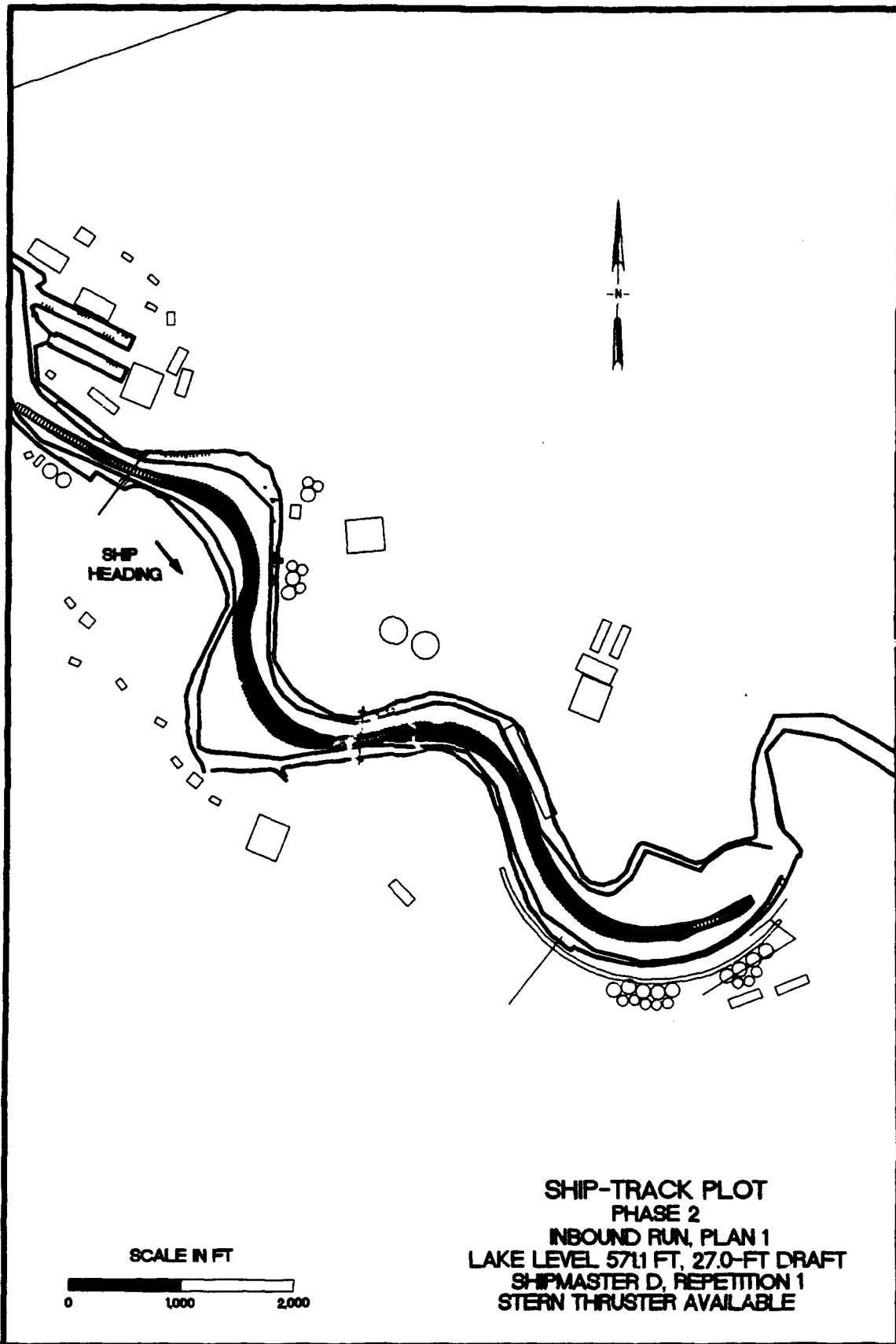
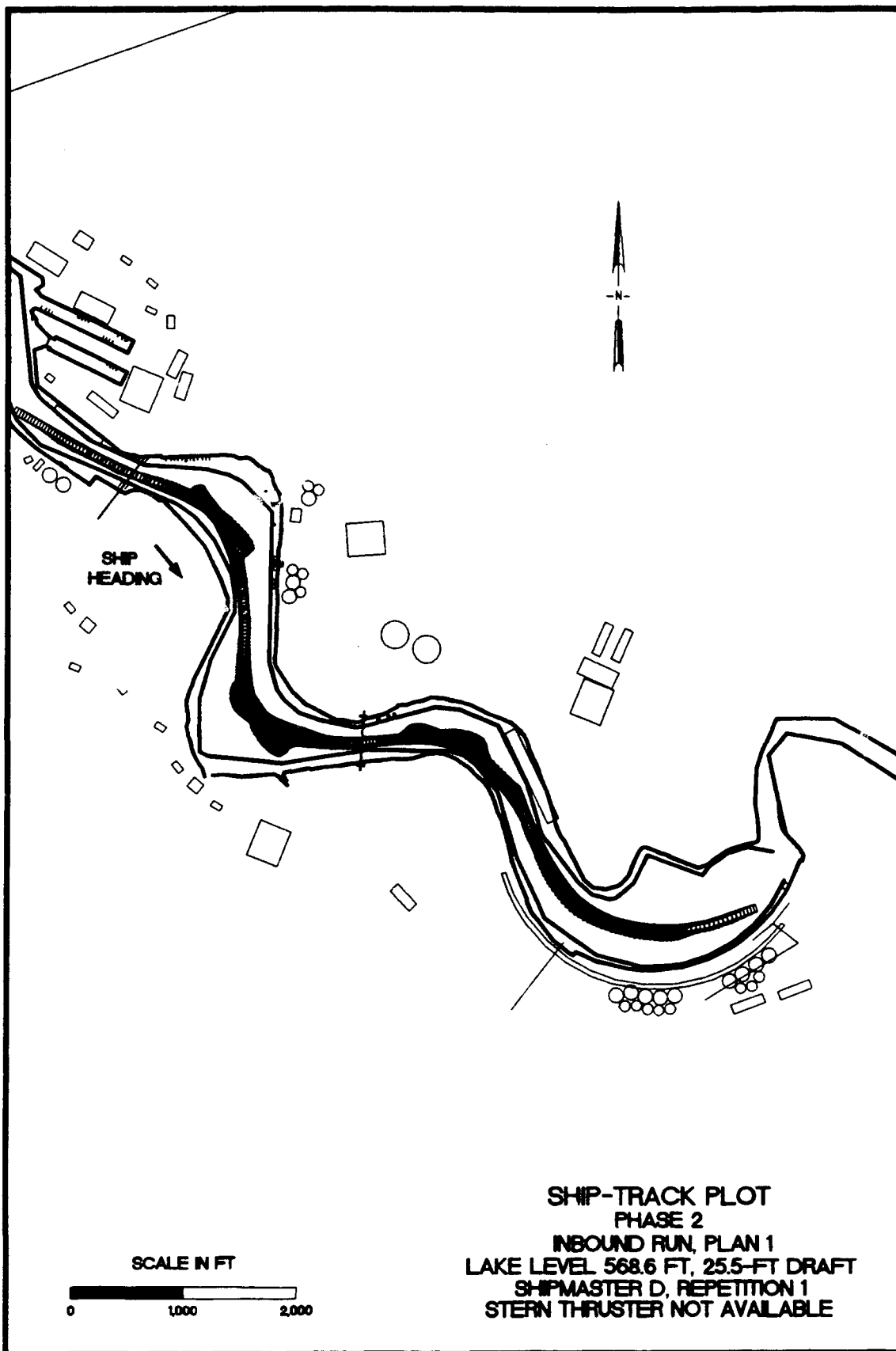


PLATE B66



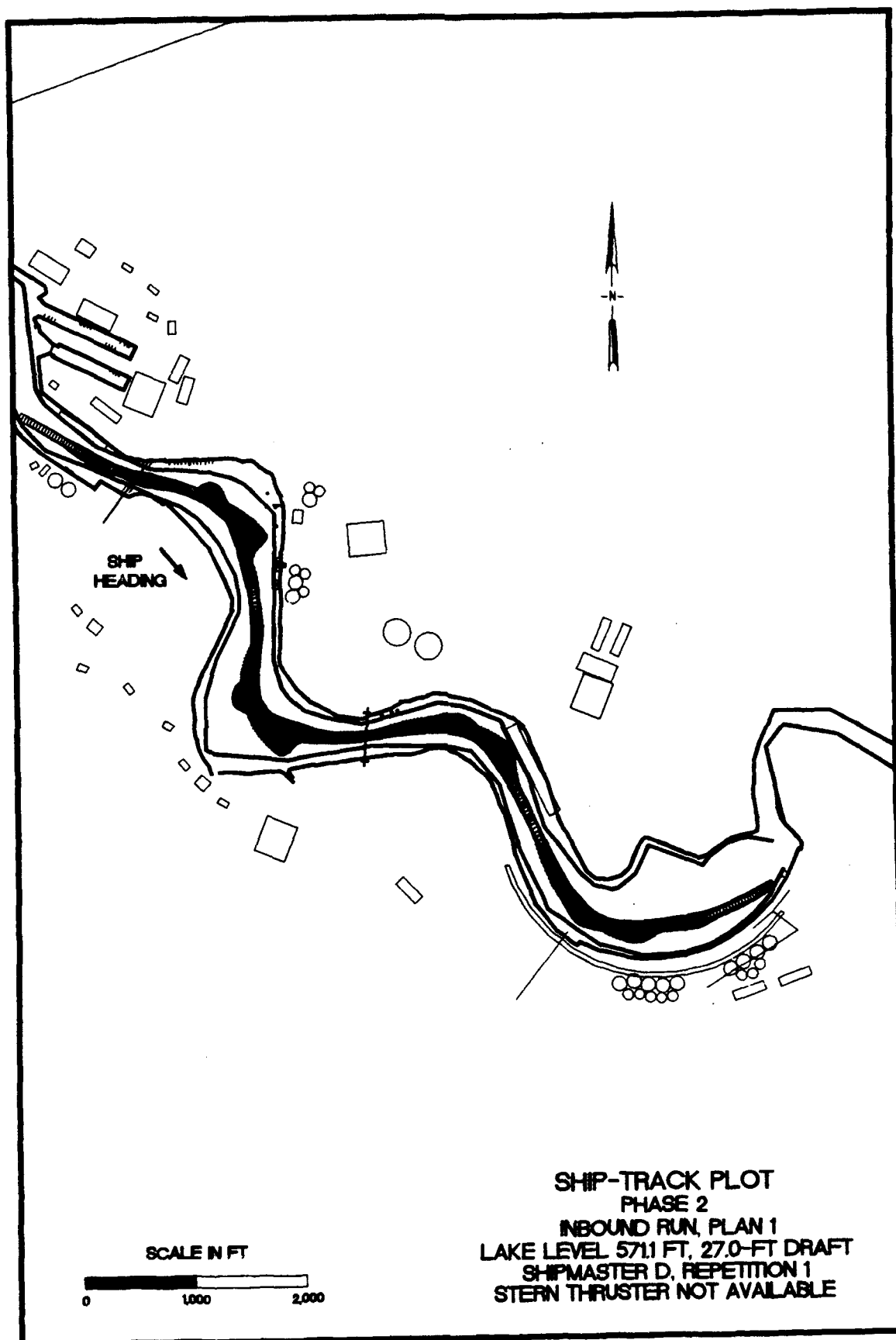
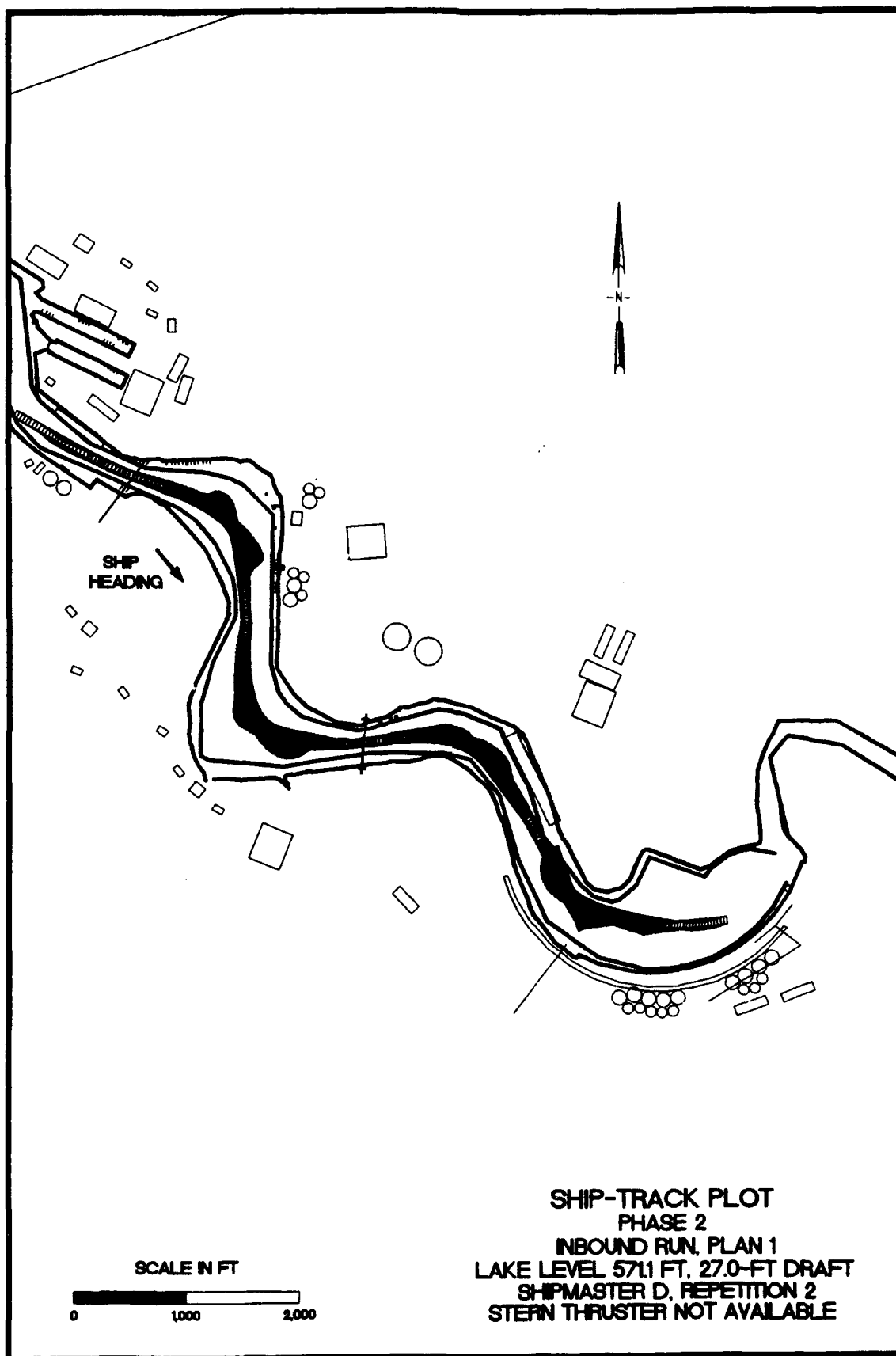


PLATE B68



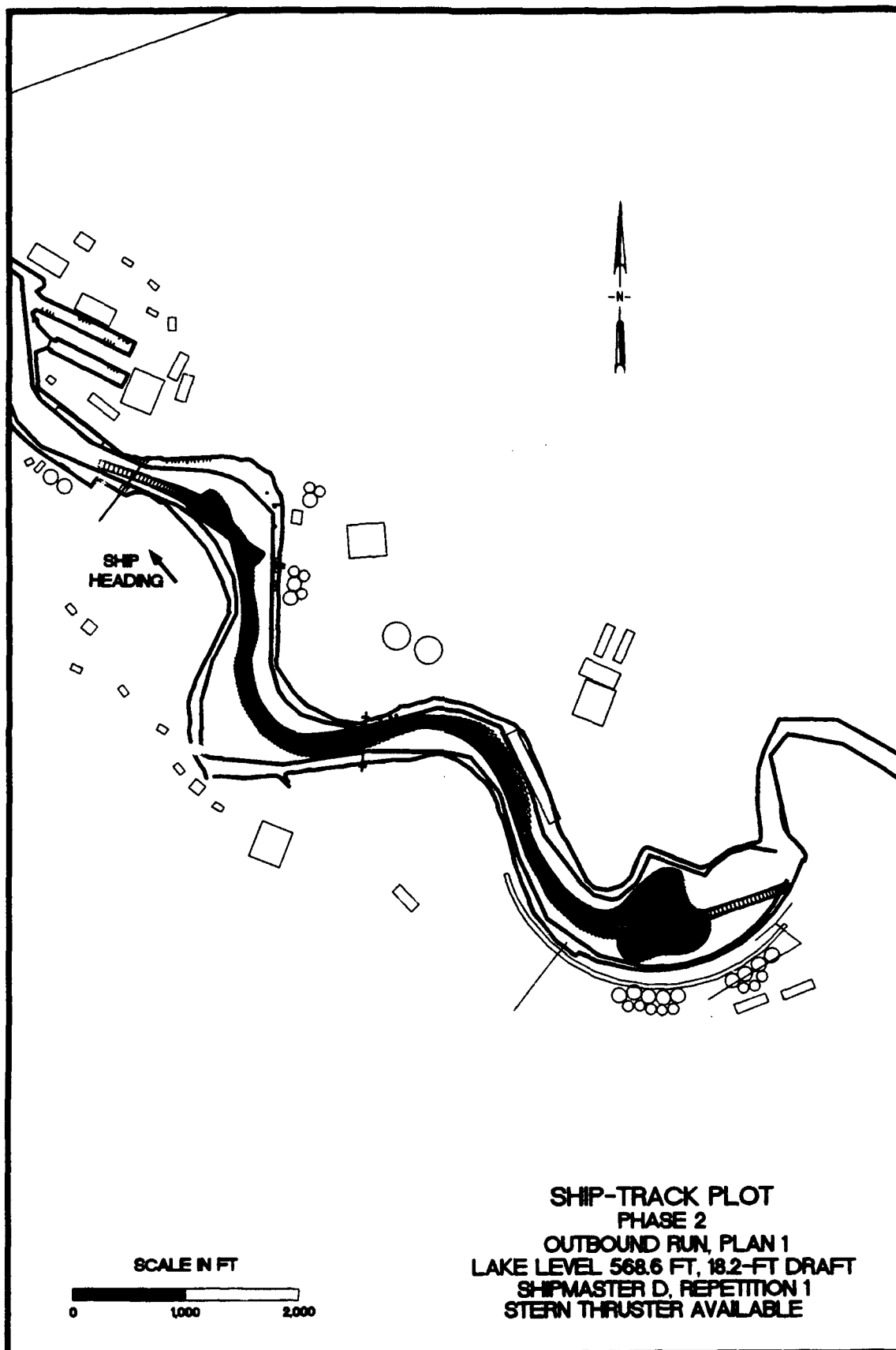
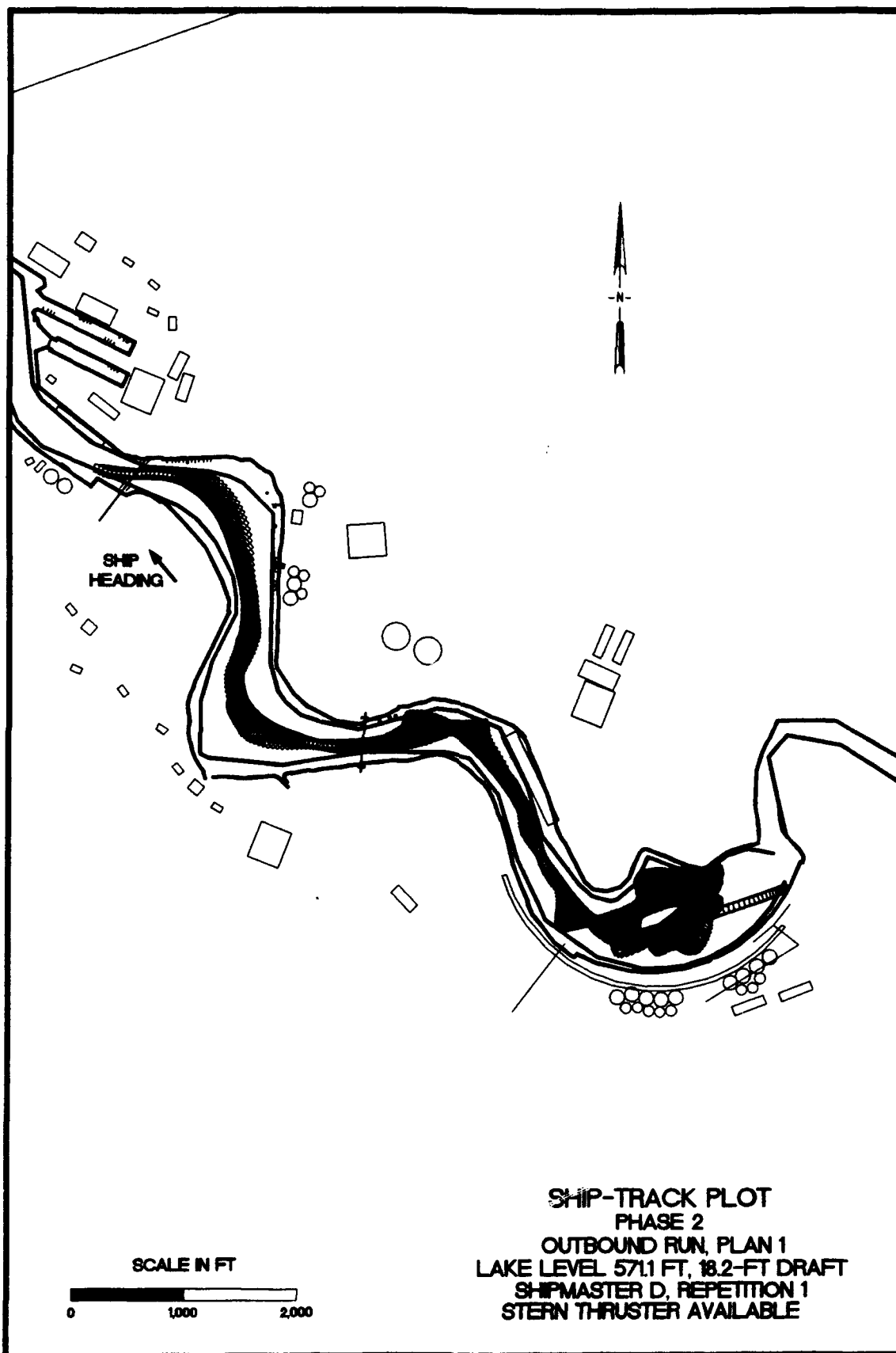


PLATE B70



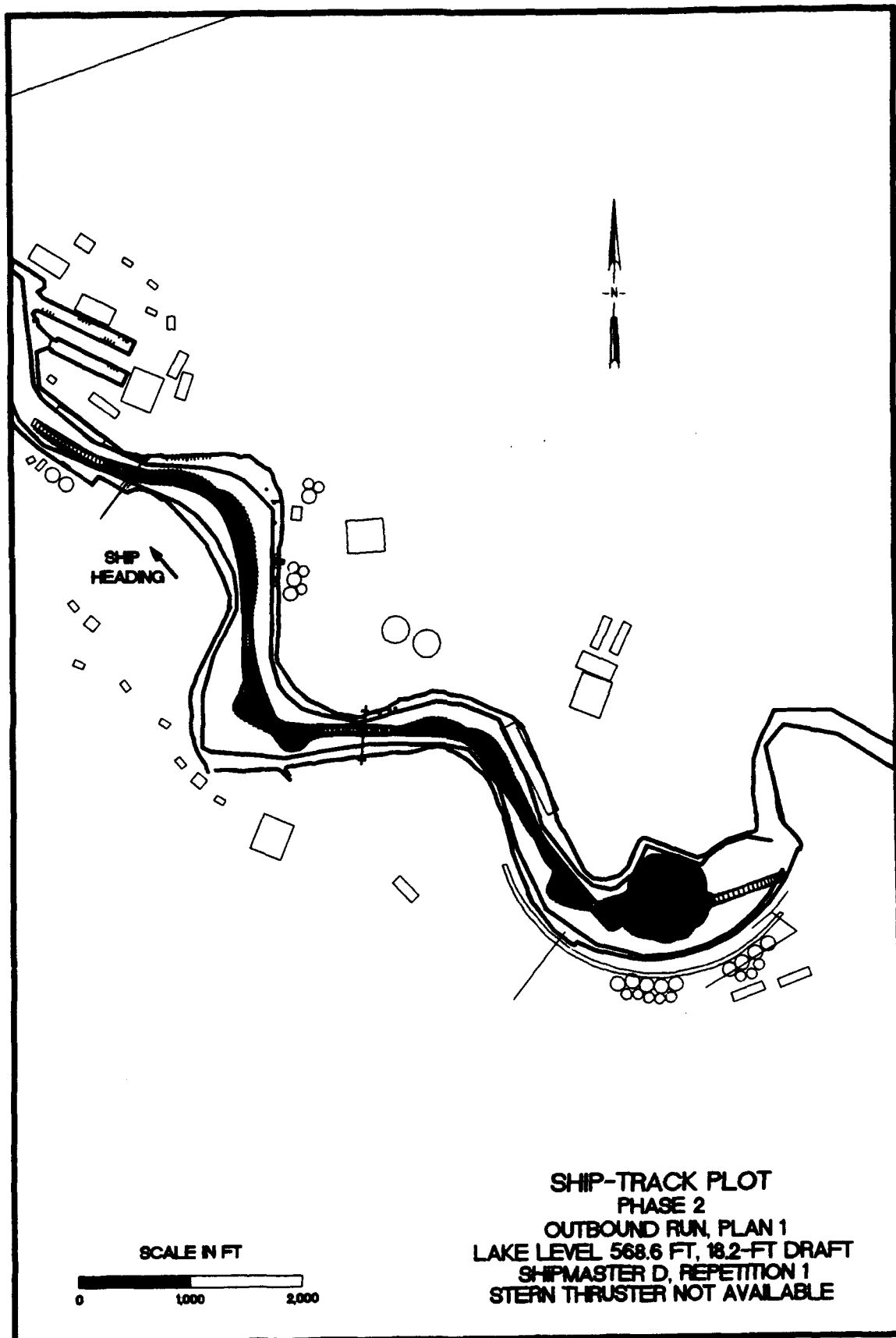
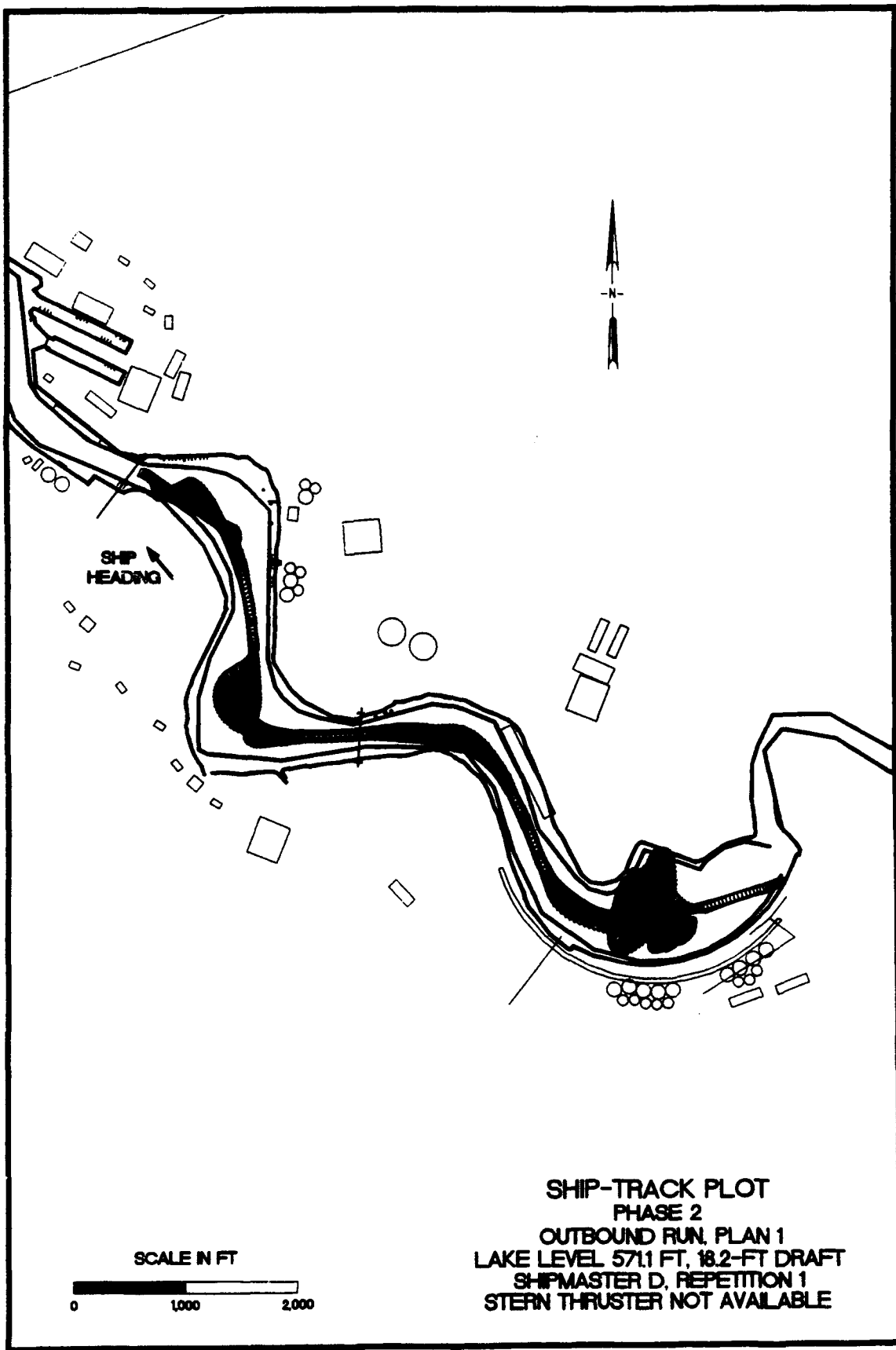


PLATE B72



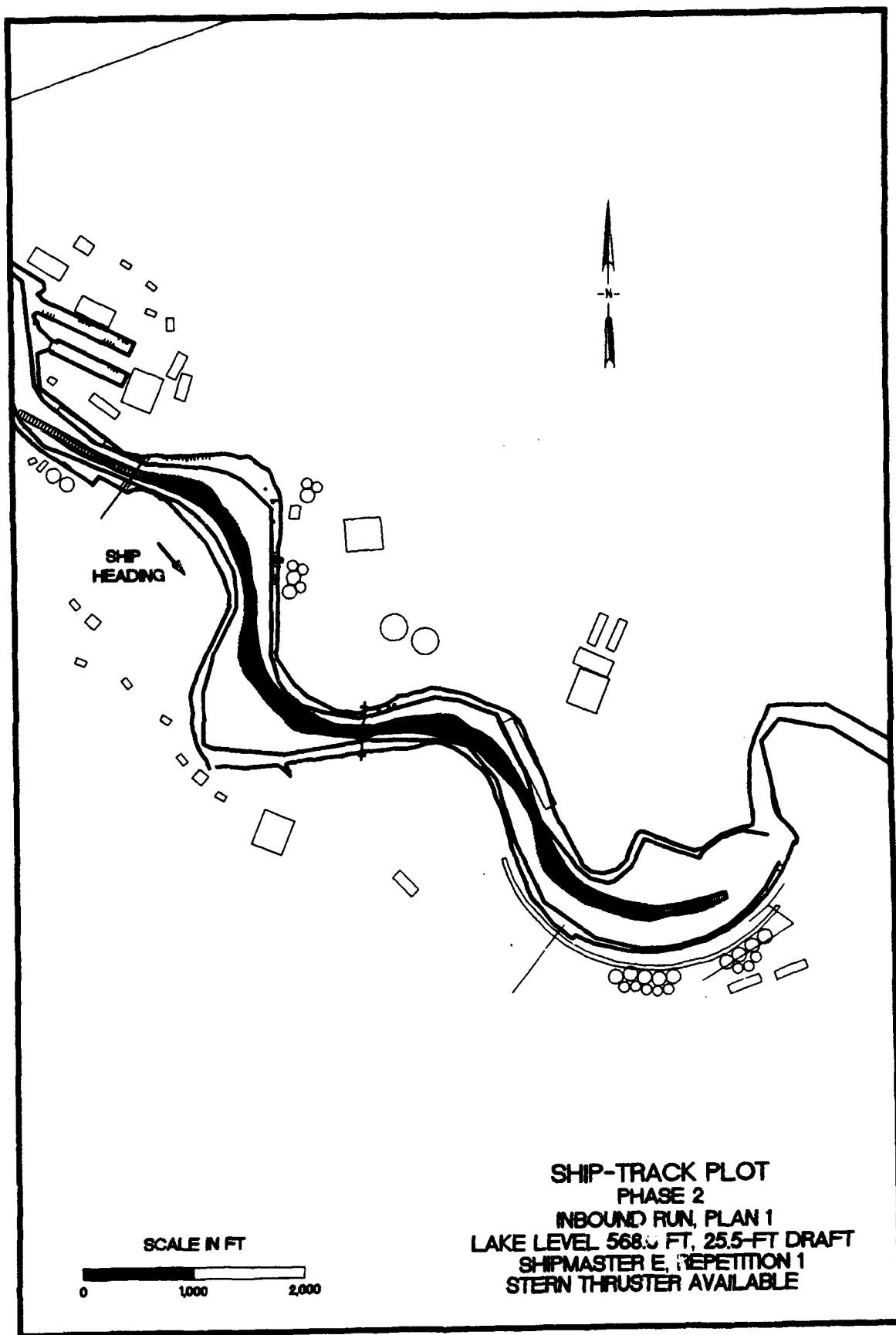
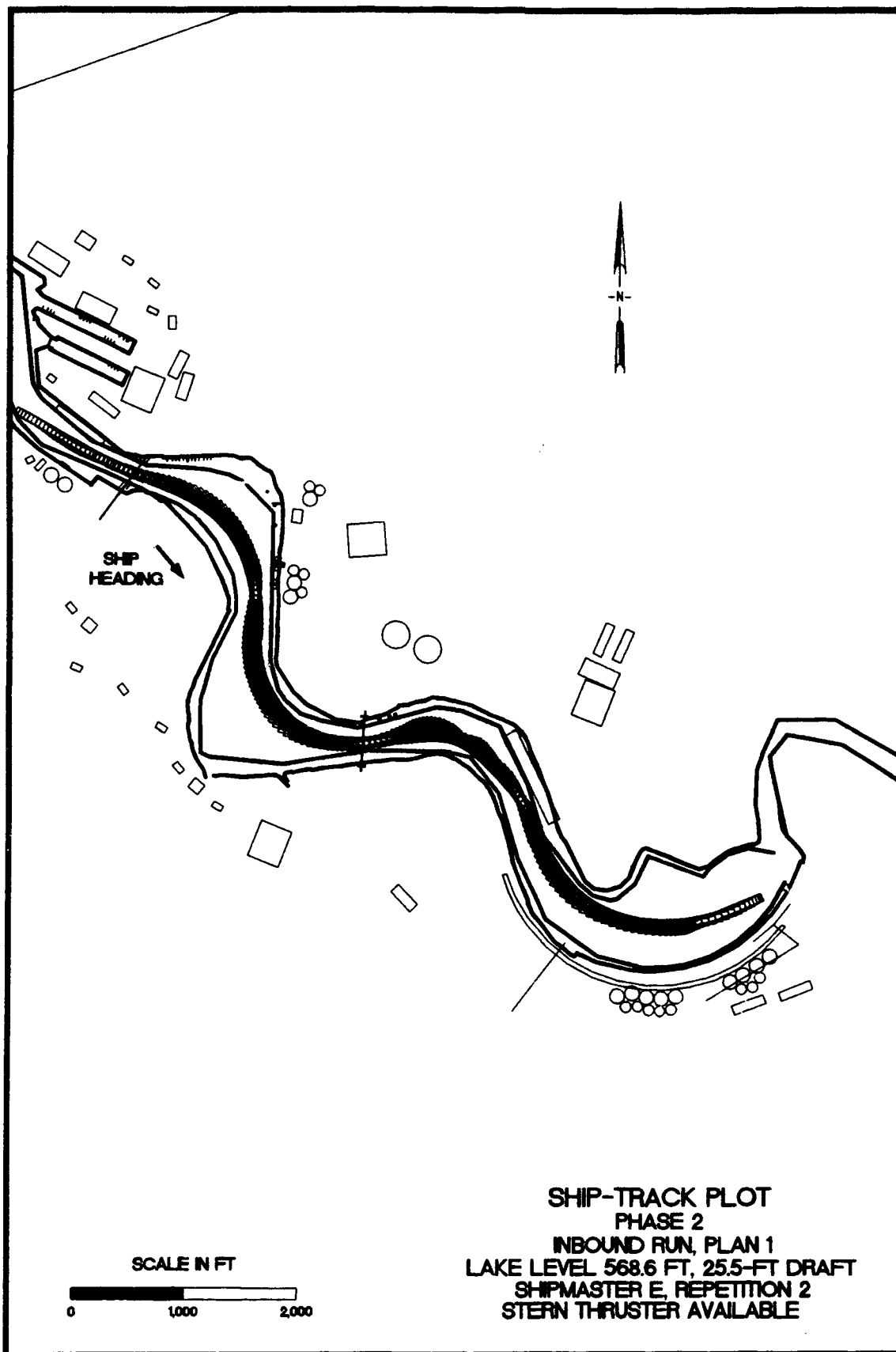


PLATE B74



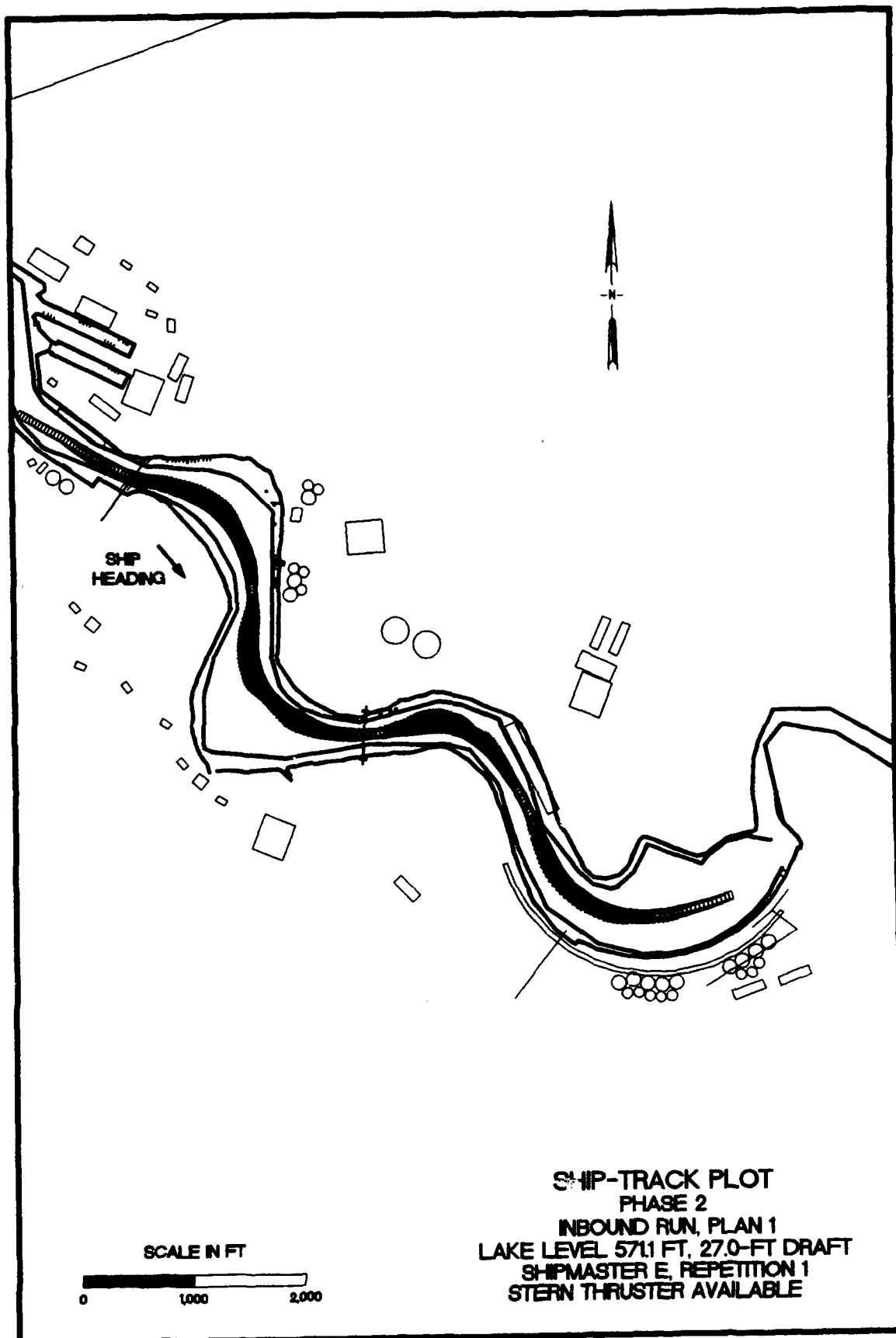


PLATE B76

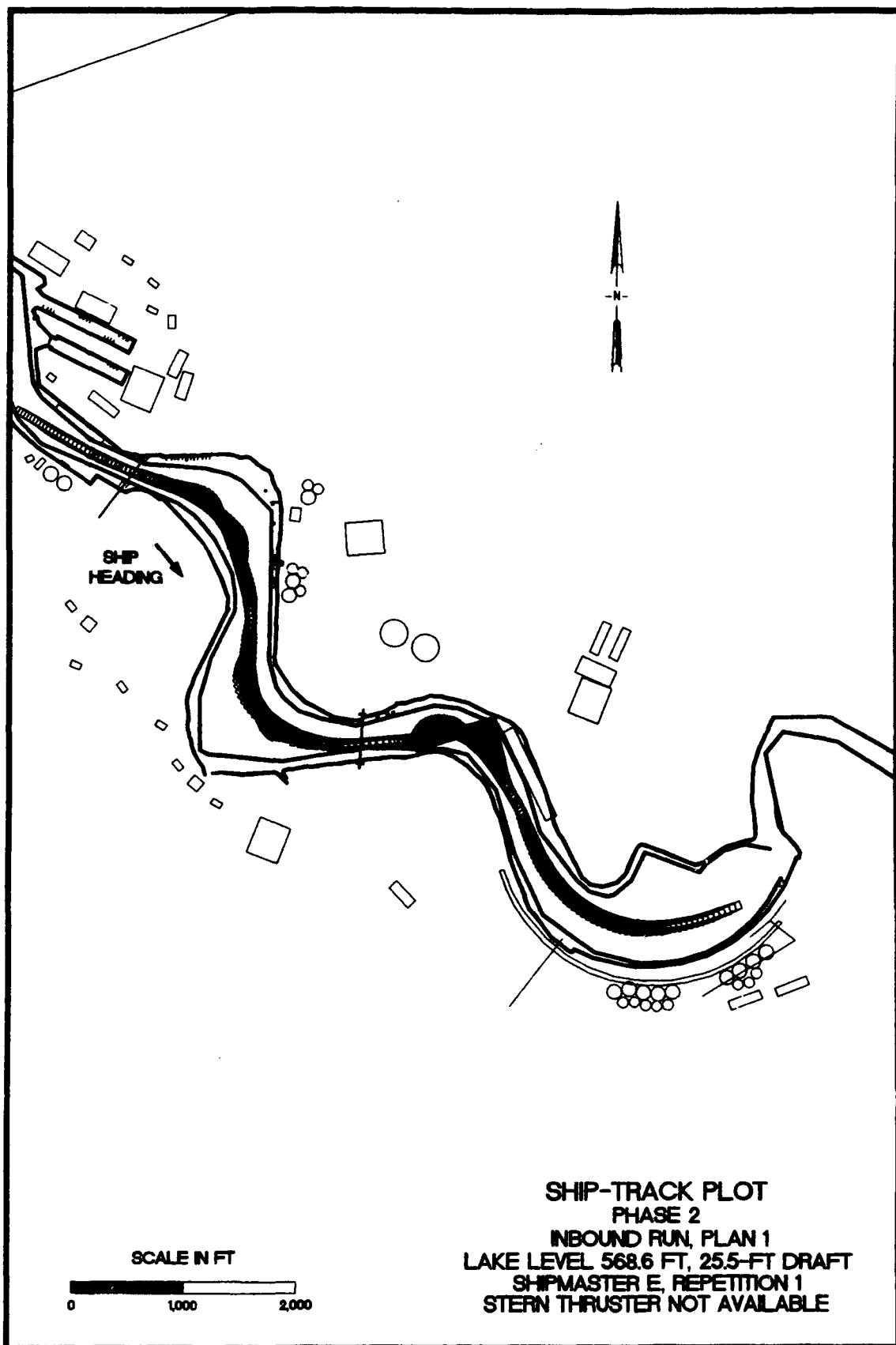


PLATE B77

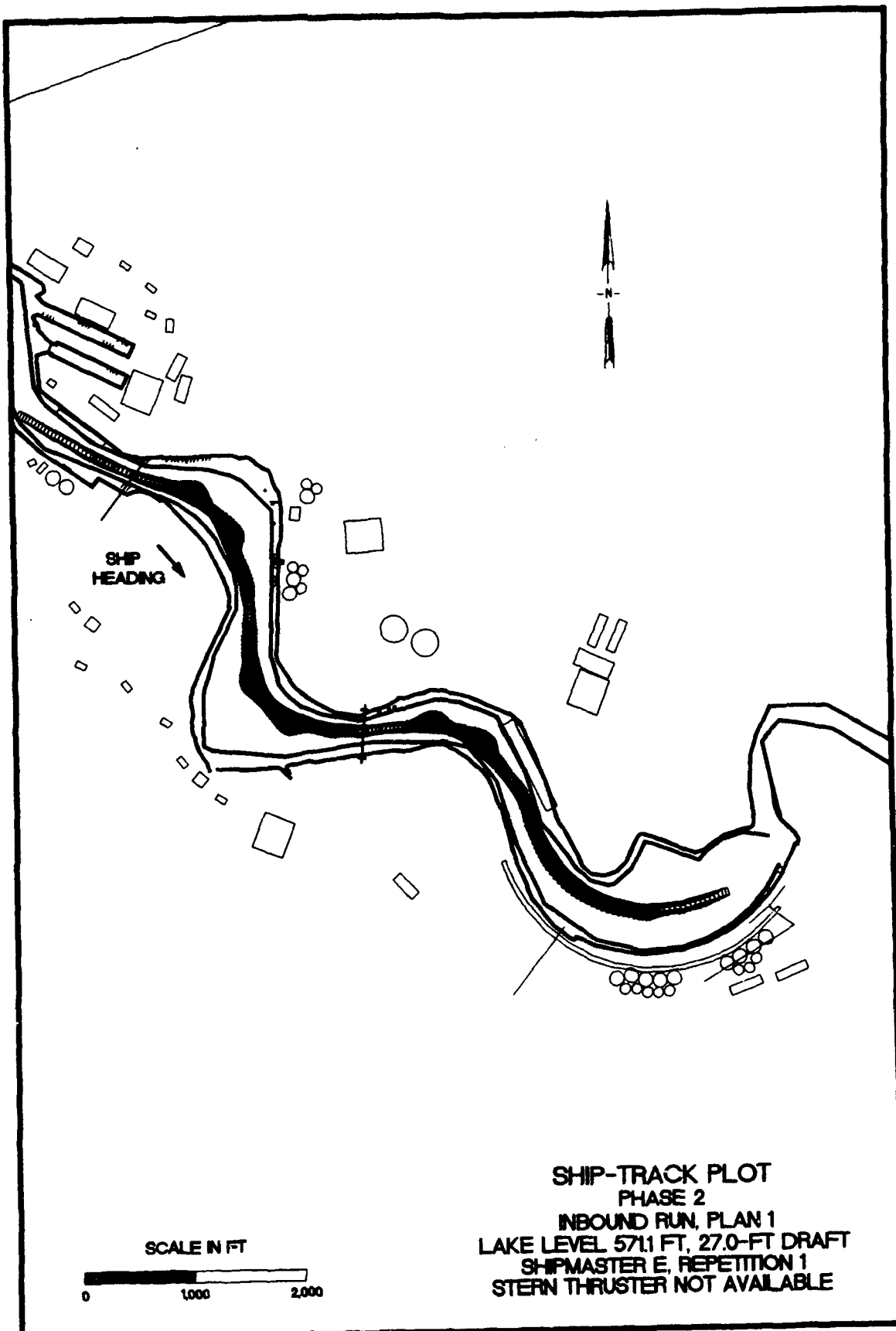
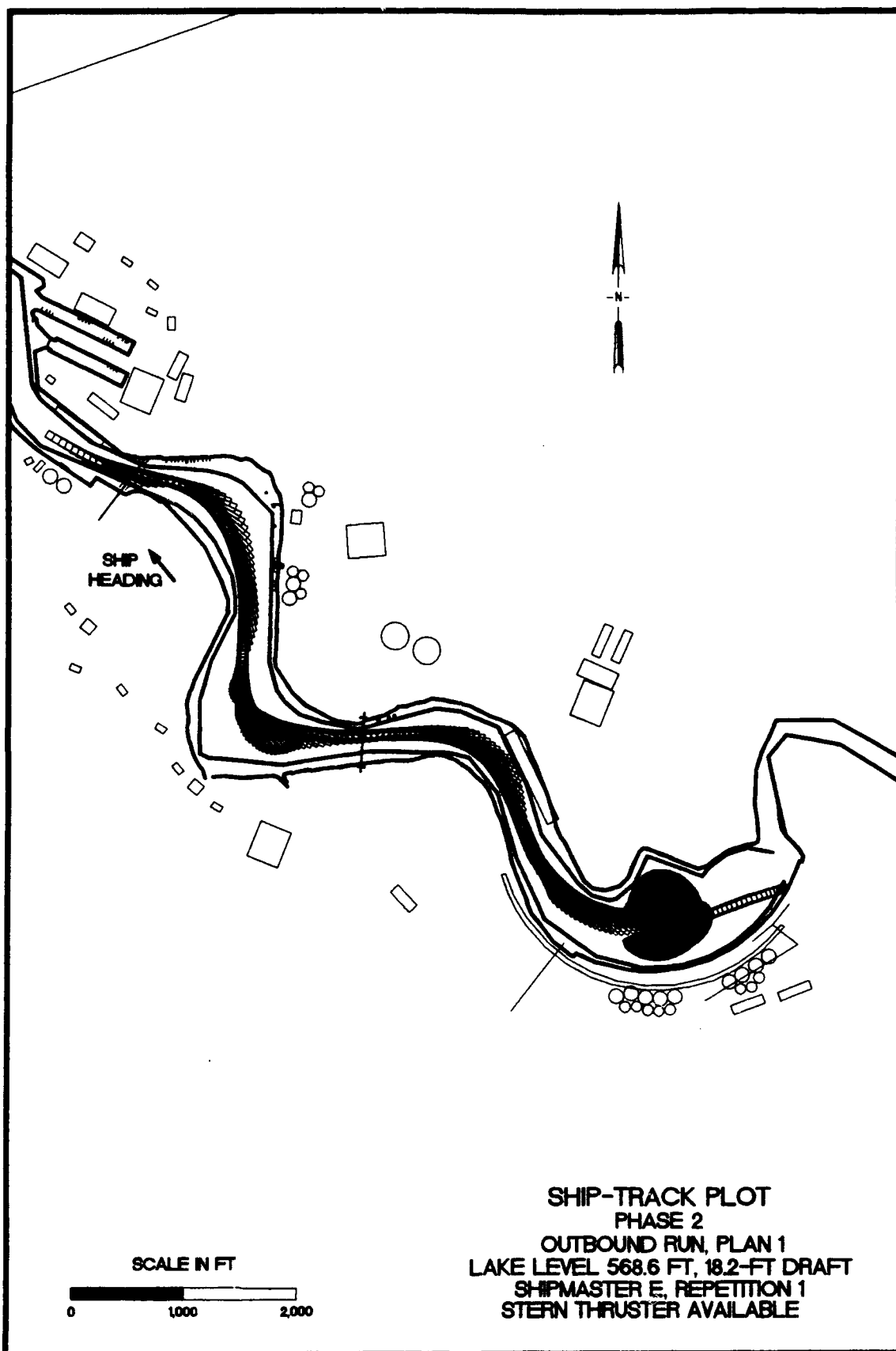


PLATE B78



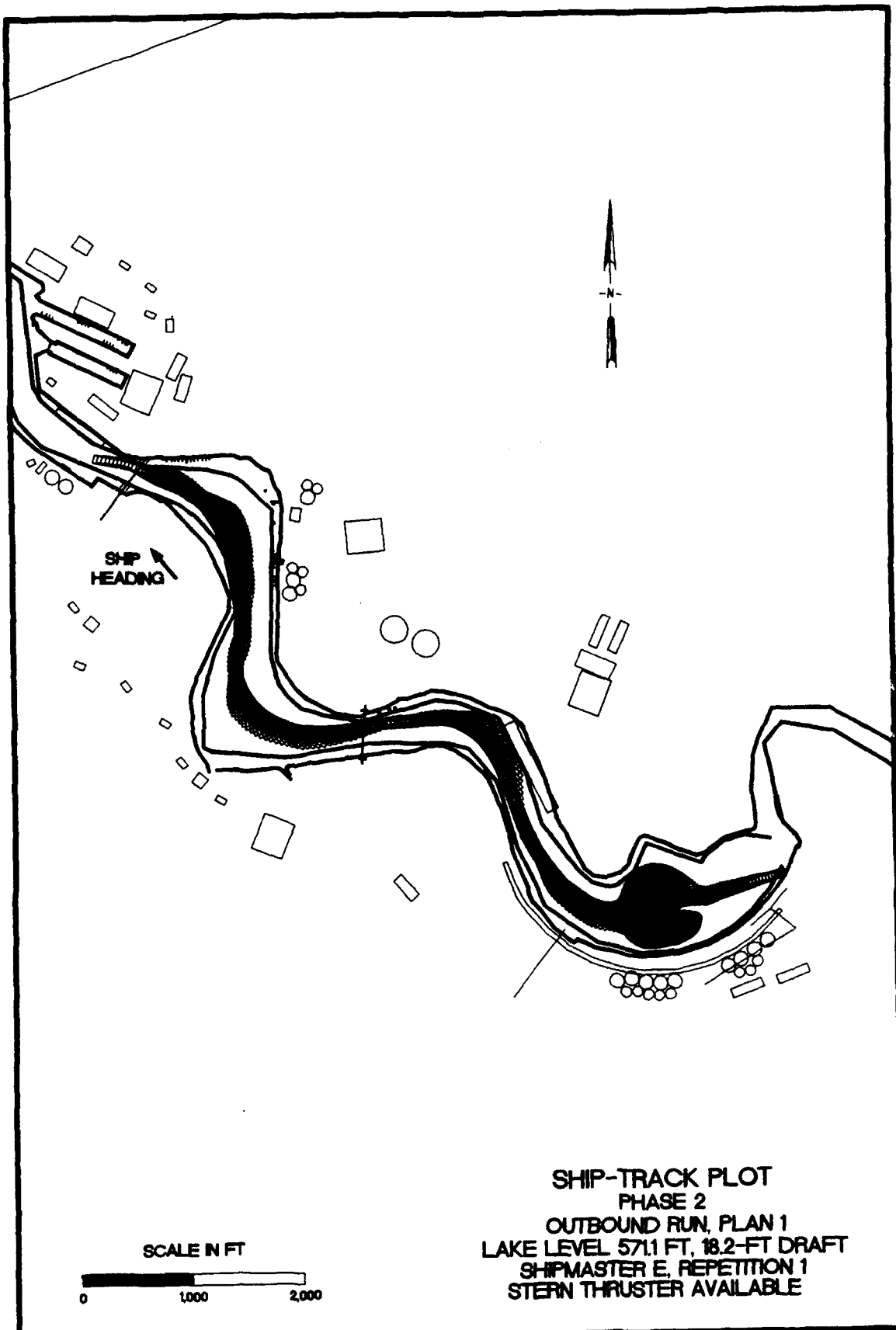
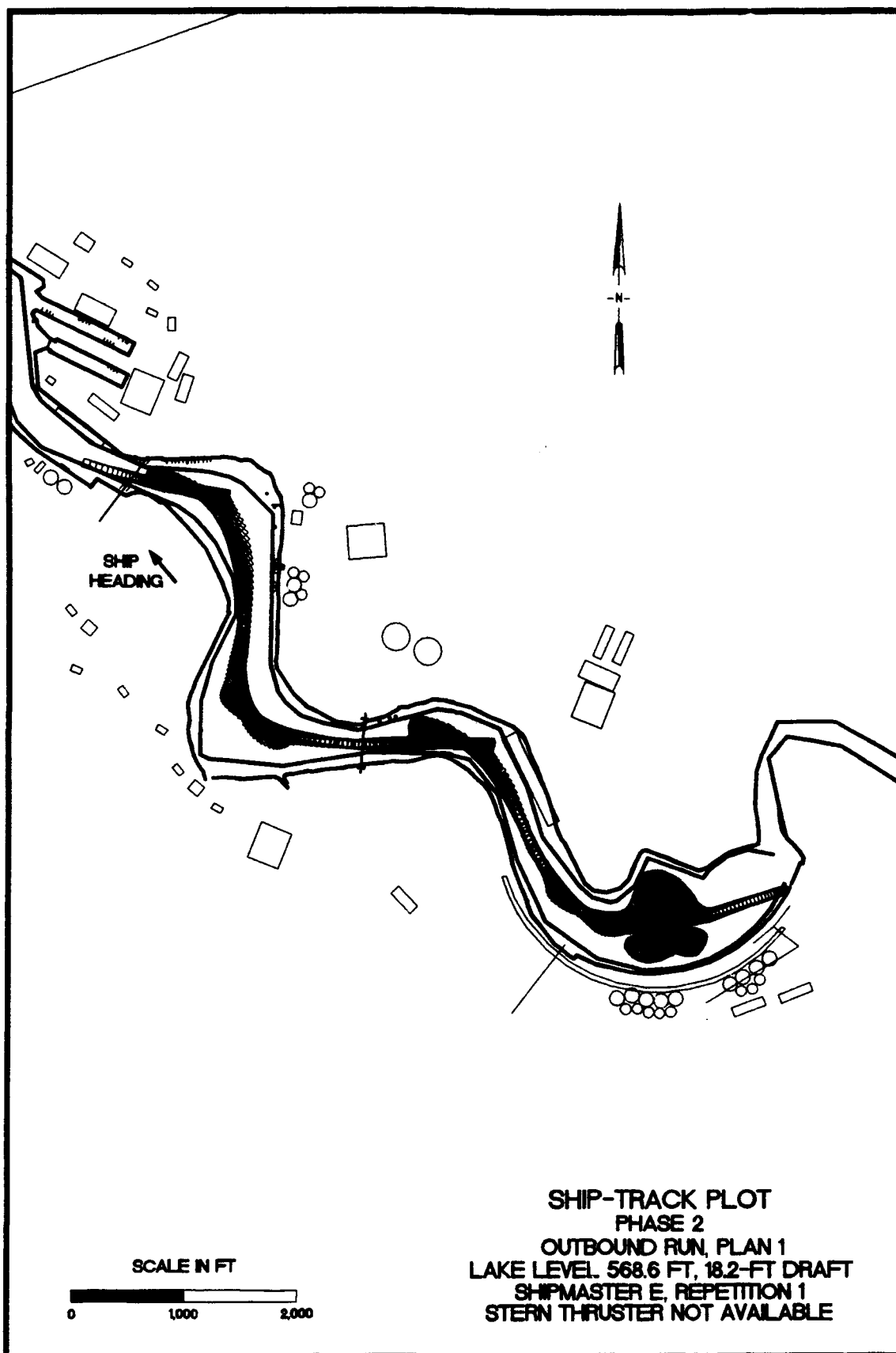


PLATE B80



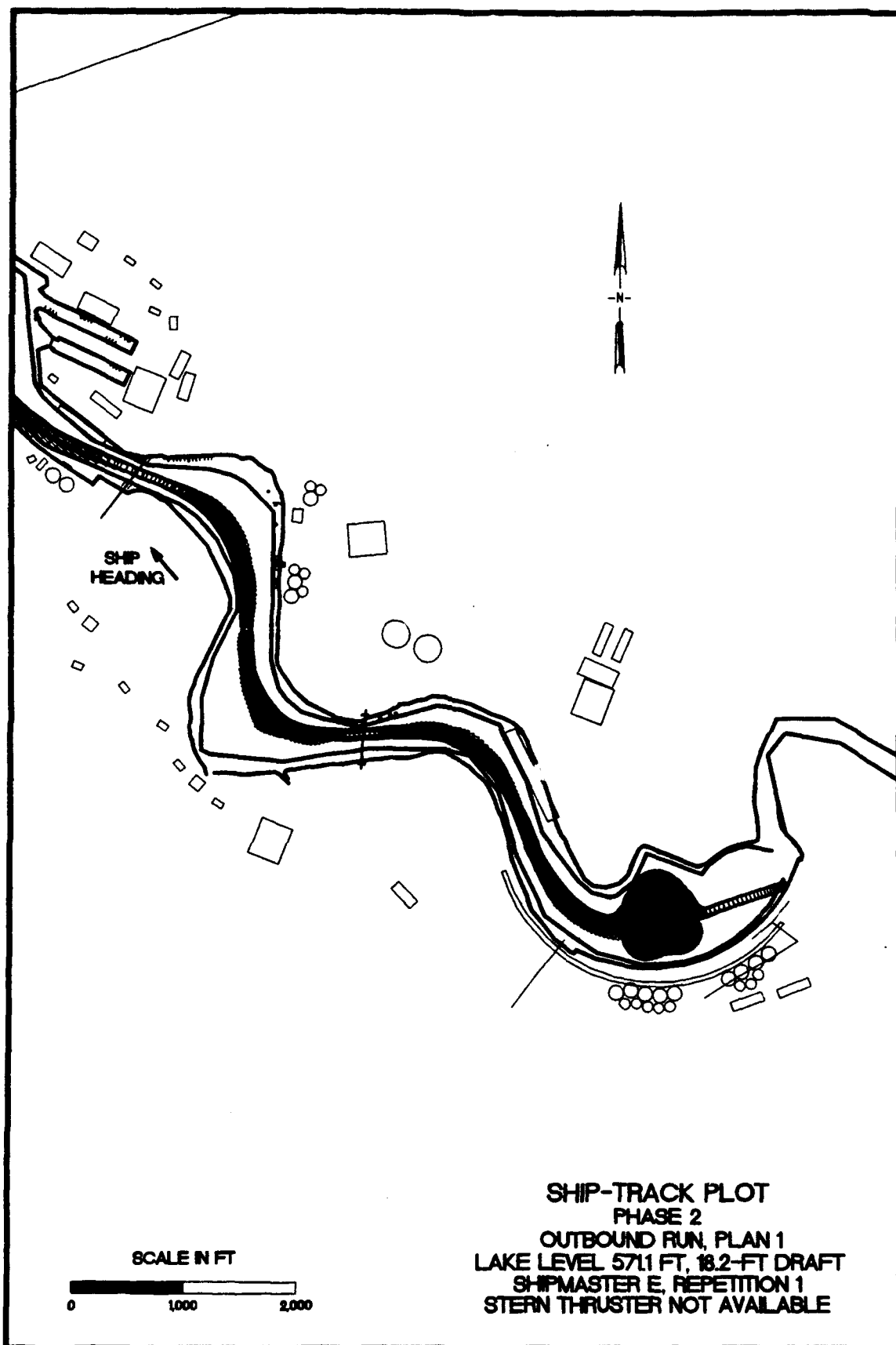
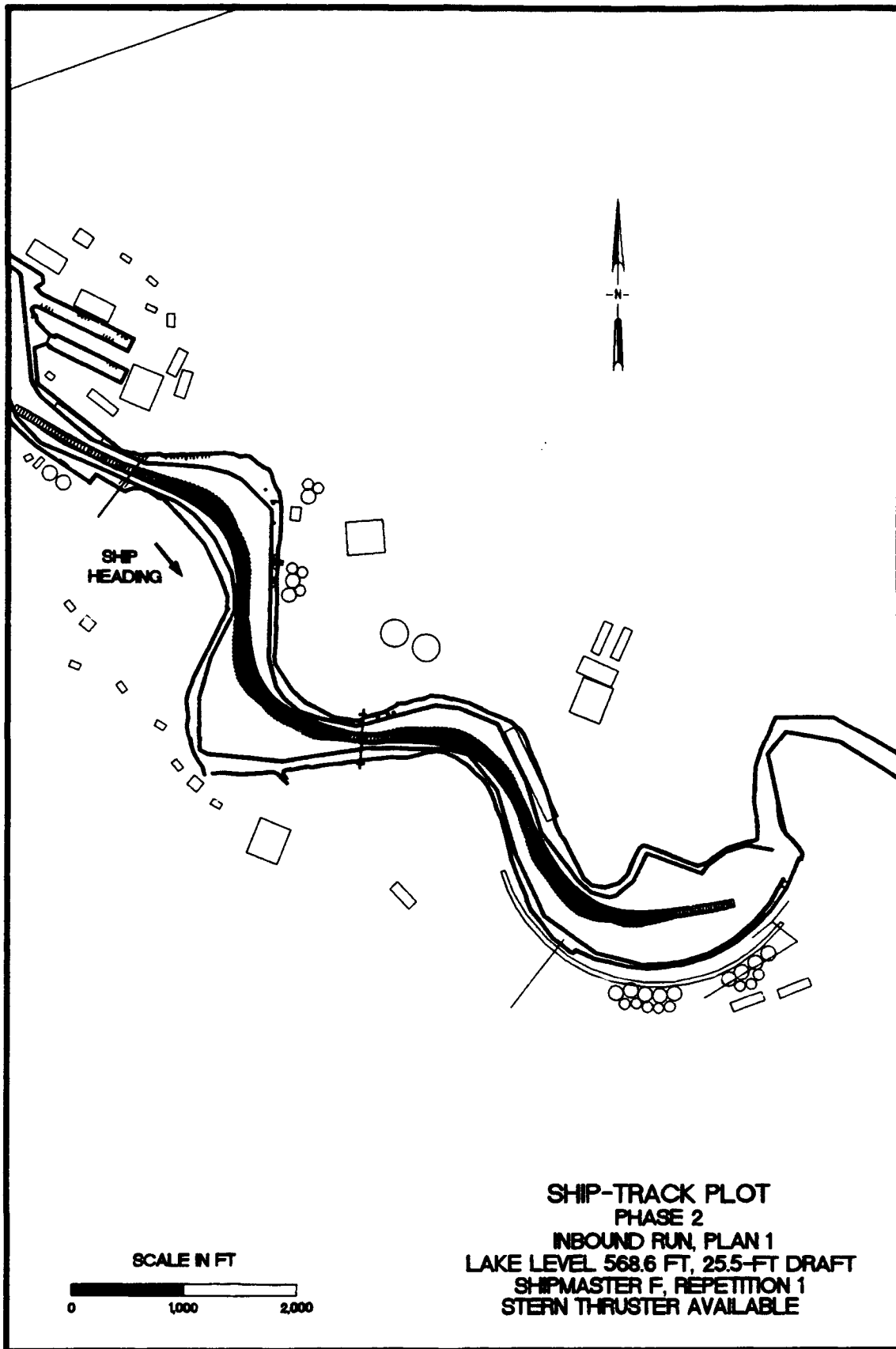


PLATE B82



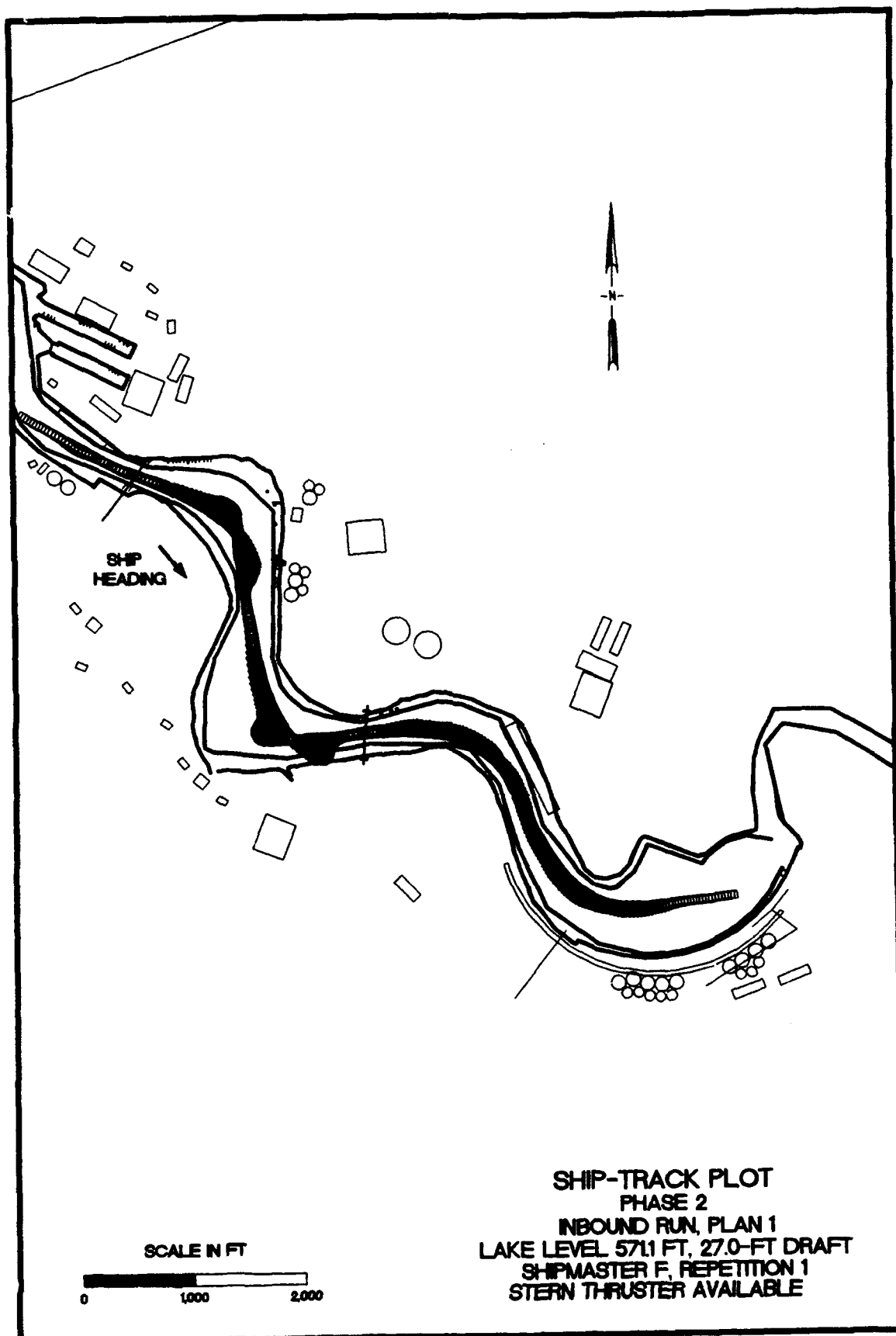
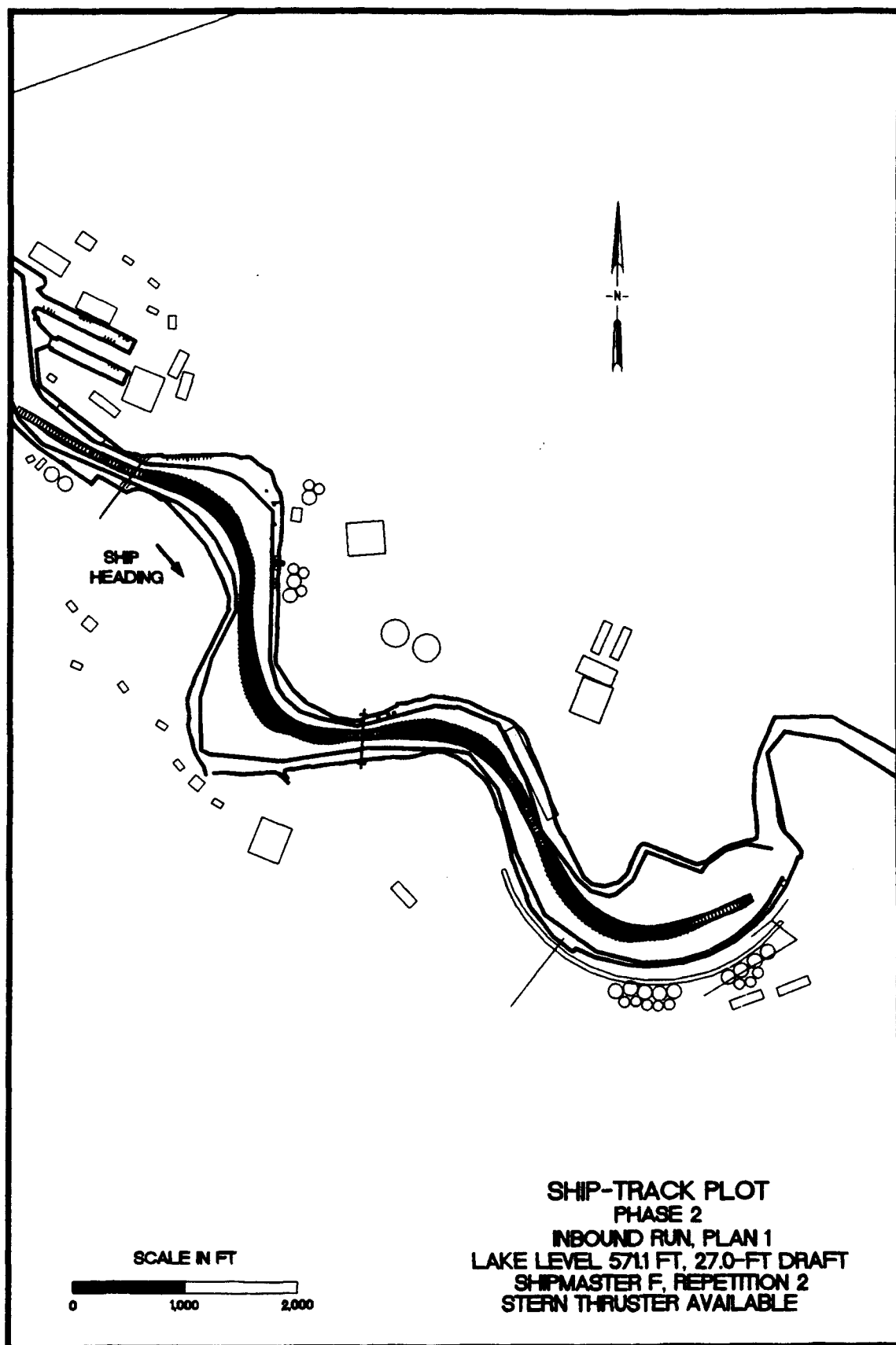


PLATE B84



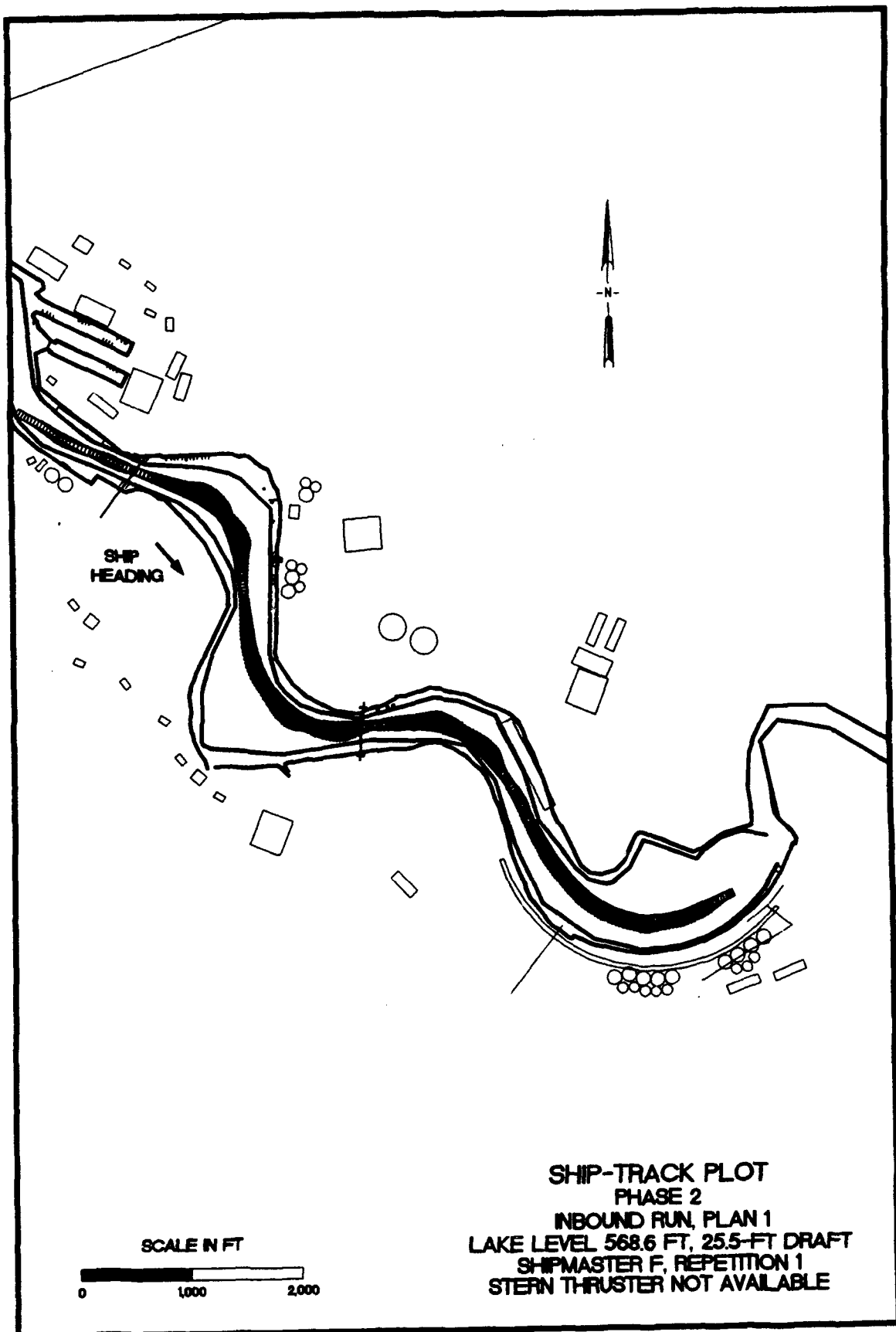
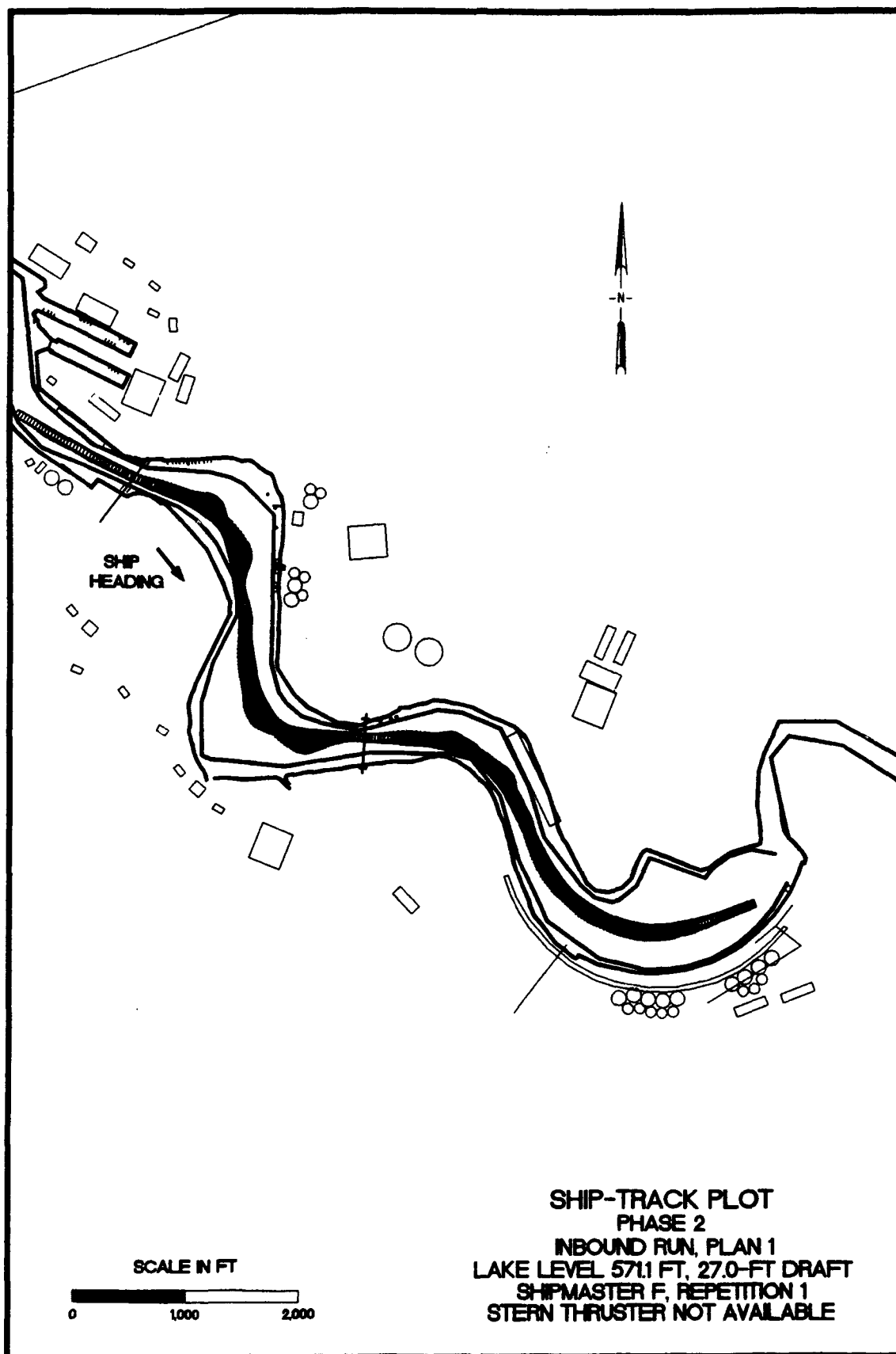


PLATE B86



SHIP-TRACK PLOT
PHASE 2
INBOUND RUN, PLAN 1
LAKE LEVEL 571.1 FT, 27.0-FT DRAFT
SHIPMASTER F, REPETITION 1
STERN THRUSTER NOT AVAILABLE

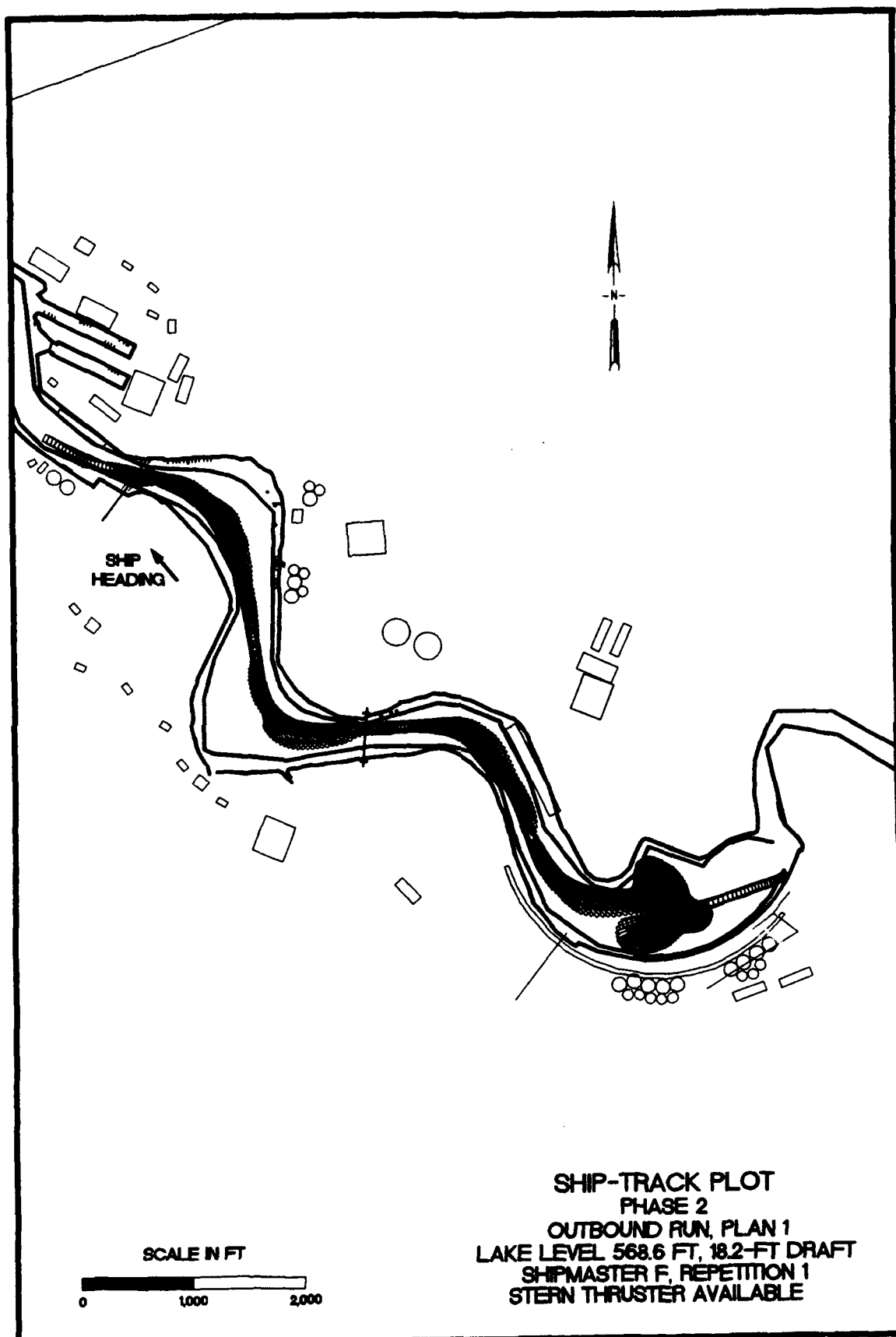
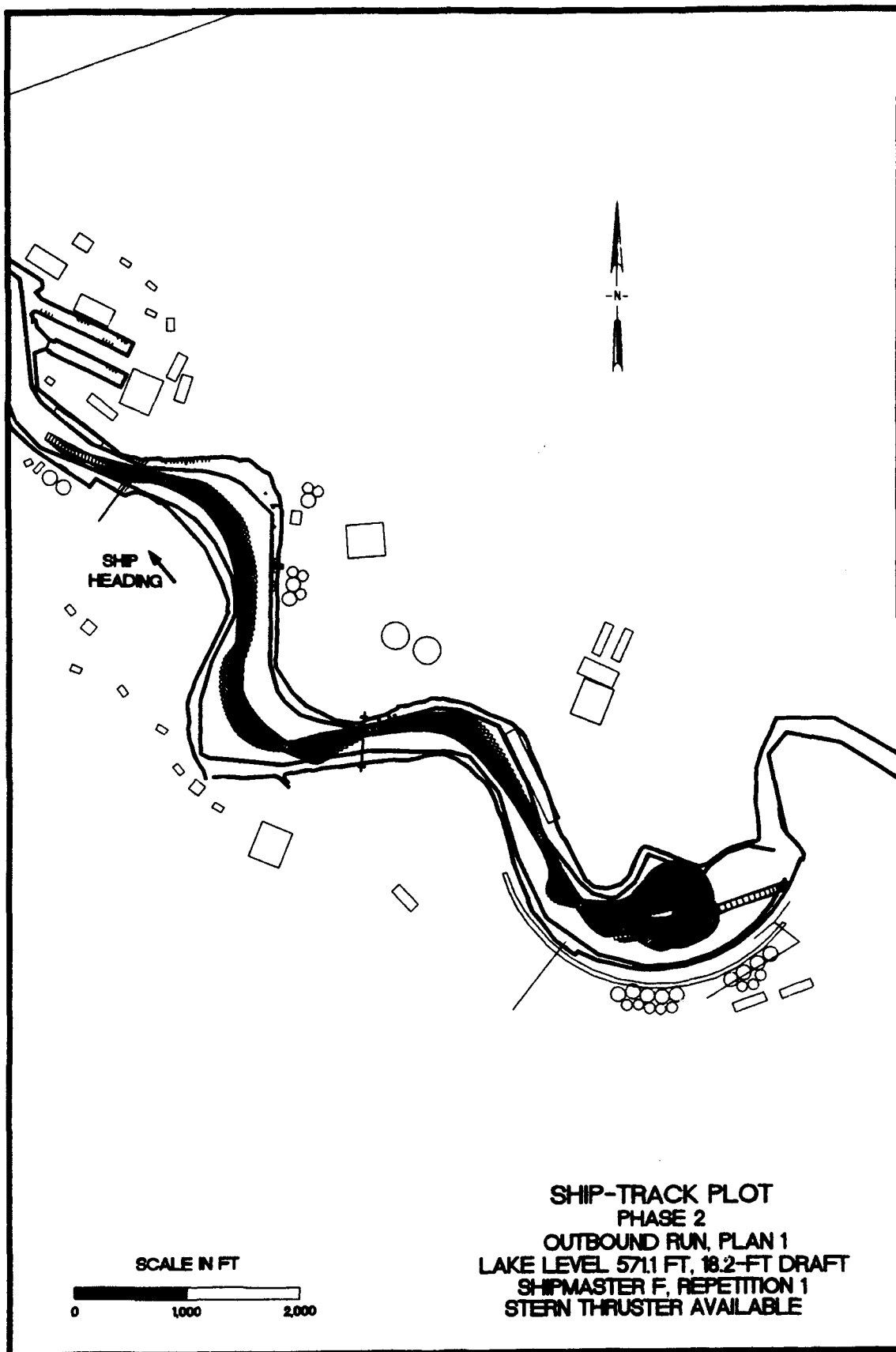


PLATE B88



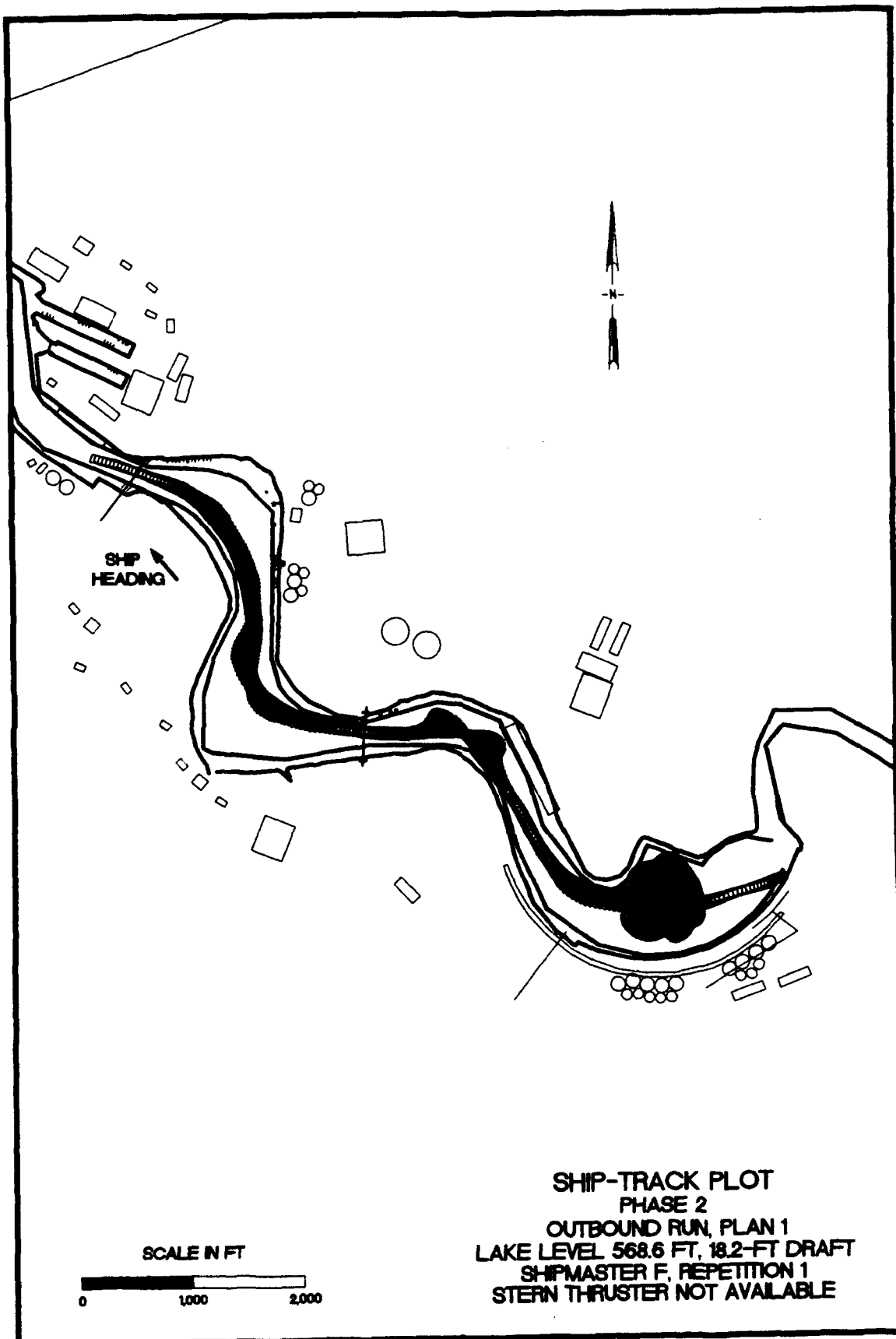
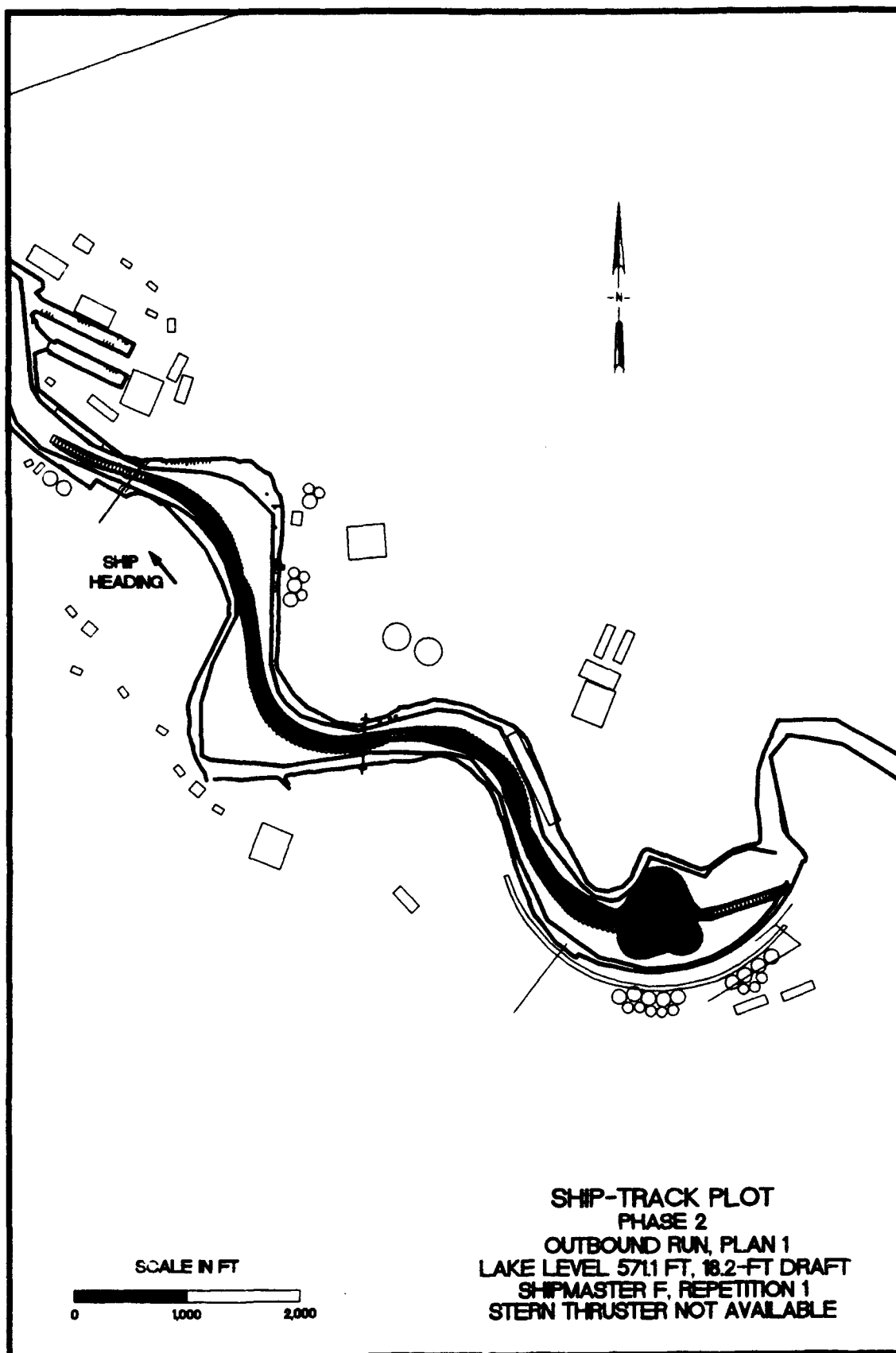


PLATE B90



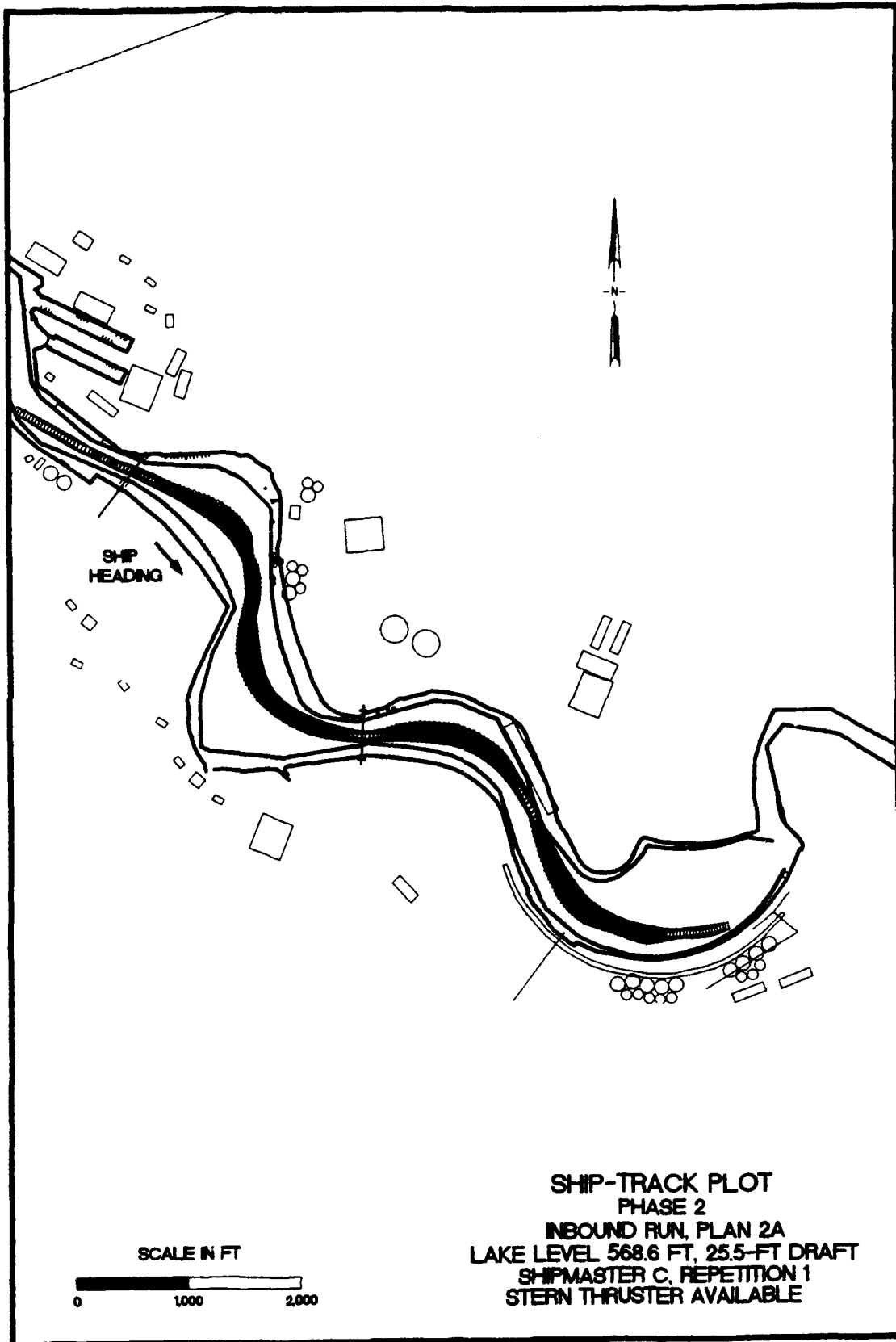
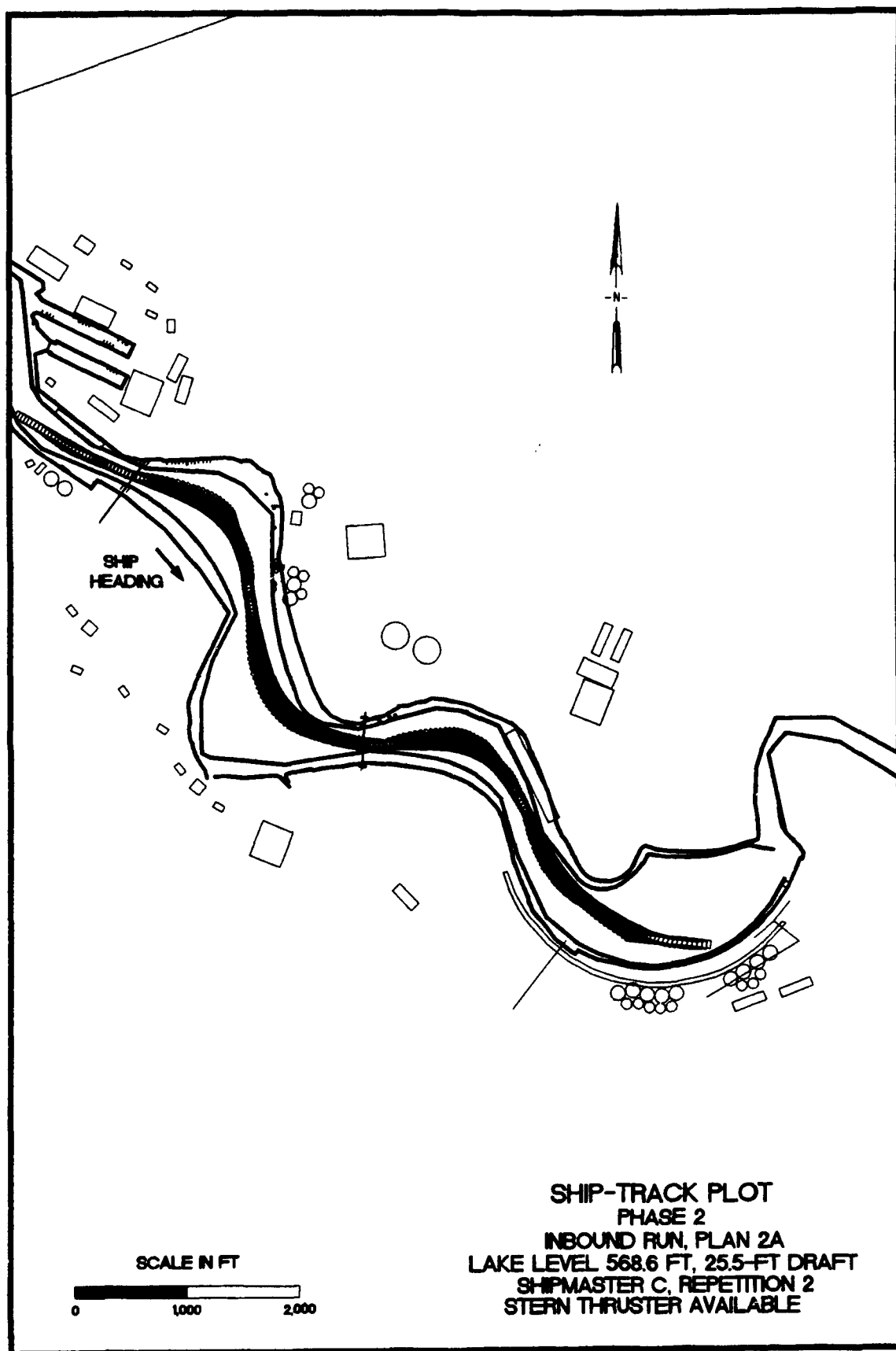


PLATE B92



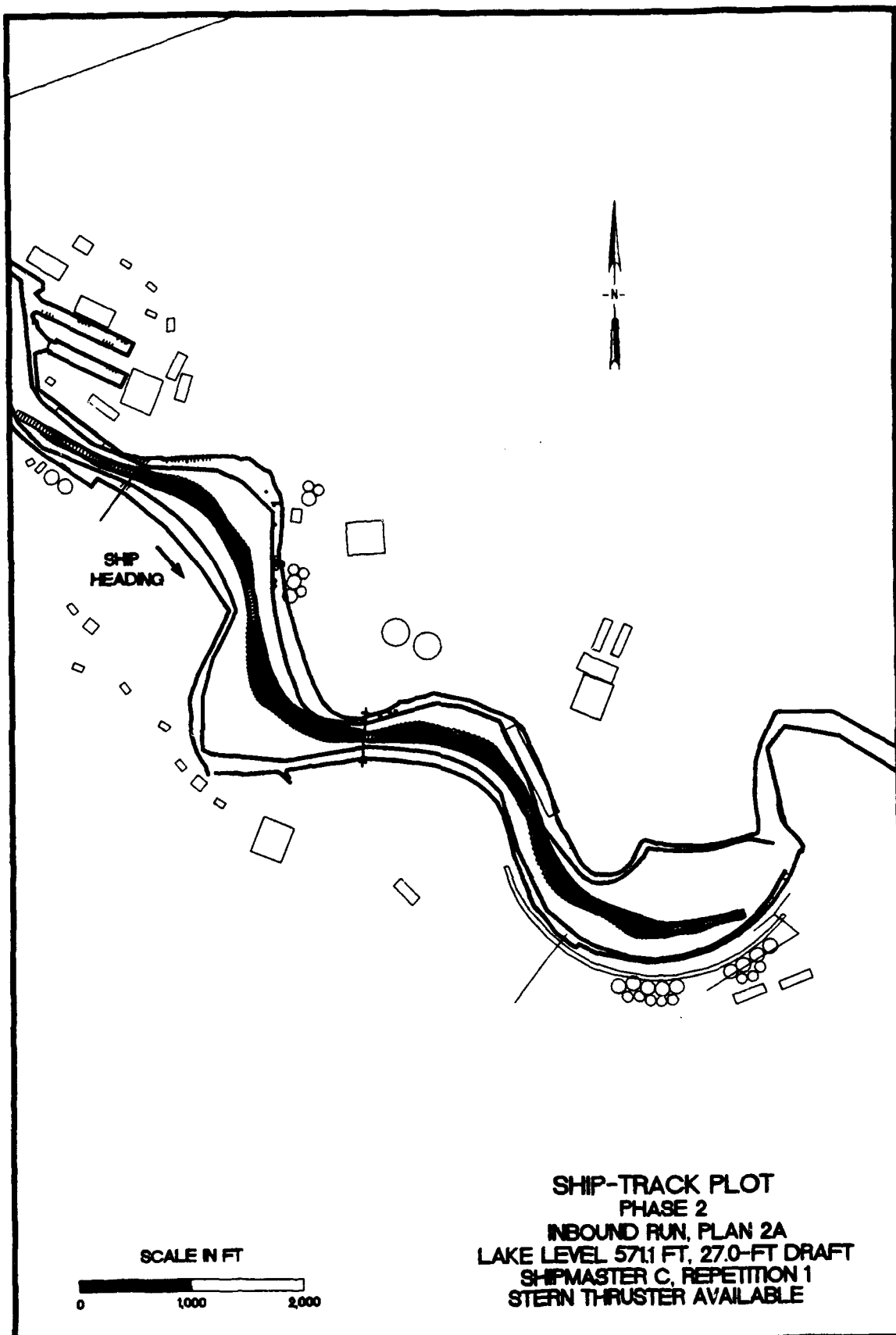
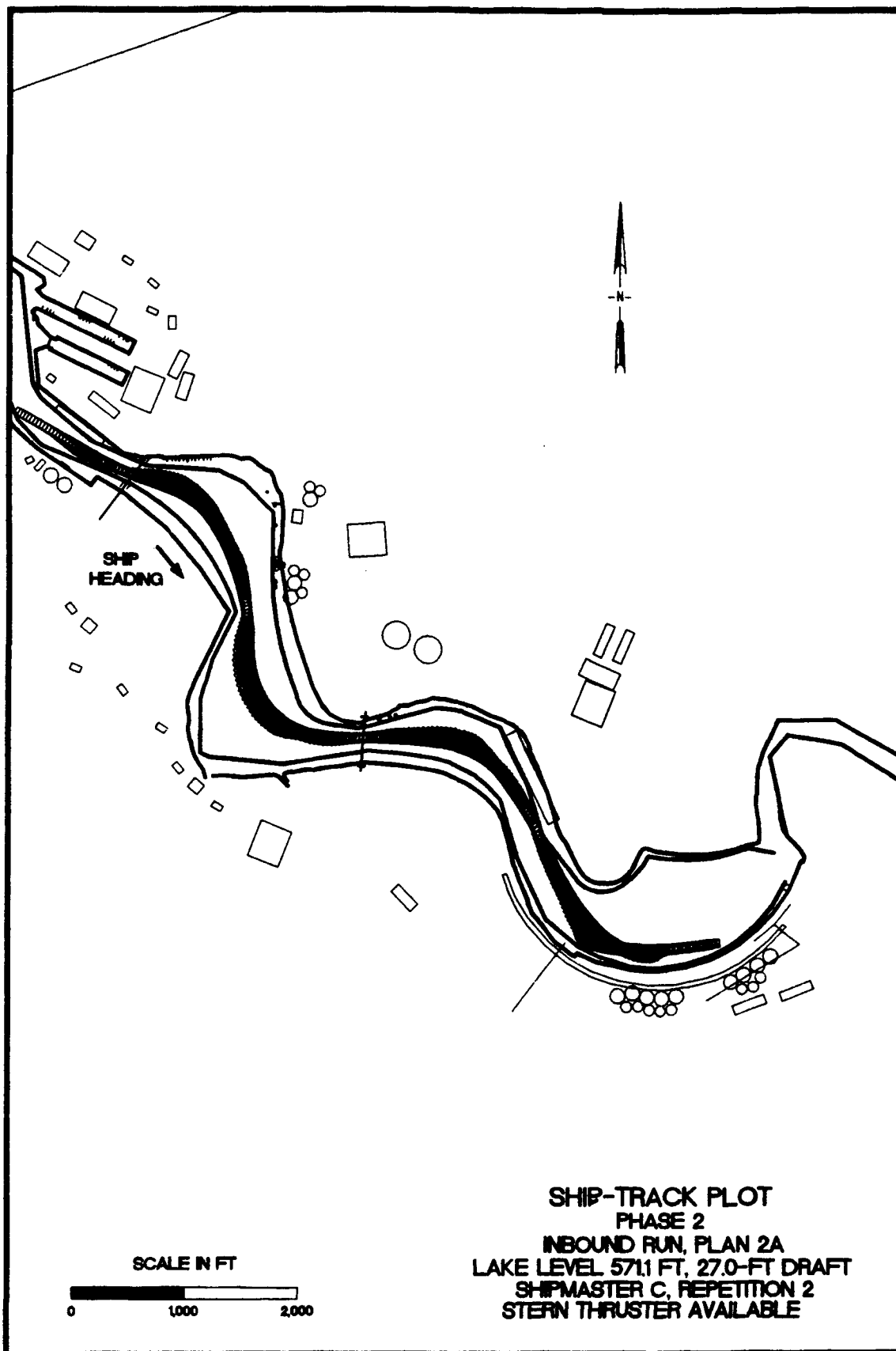


PLATE B94



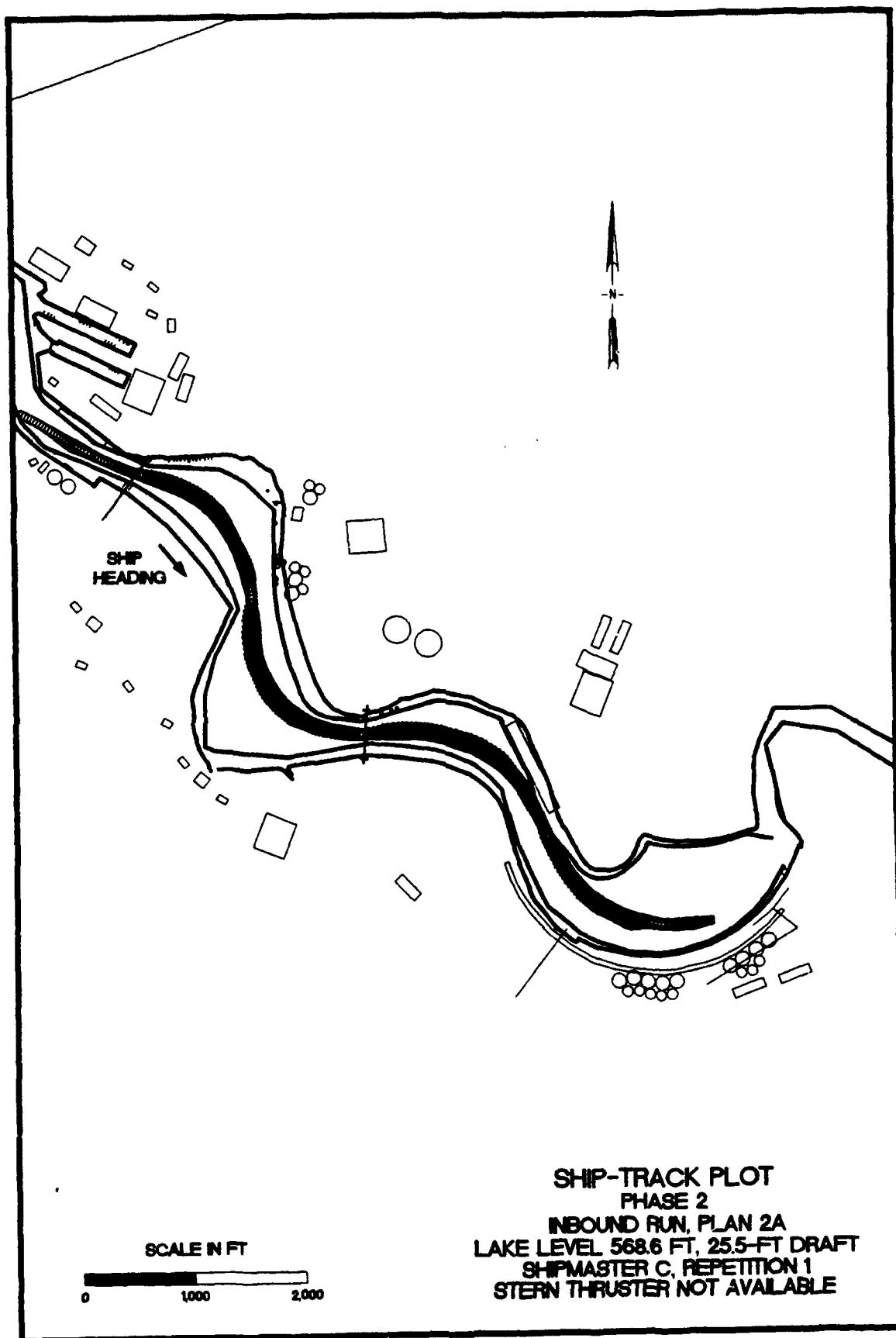
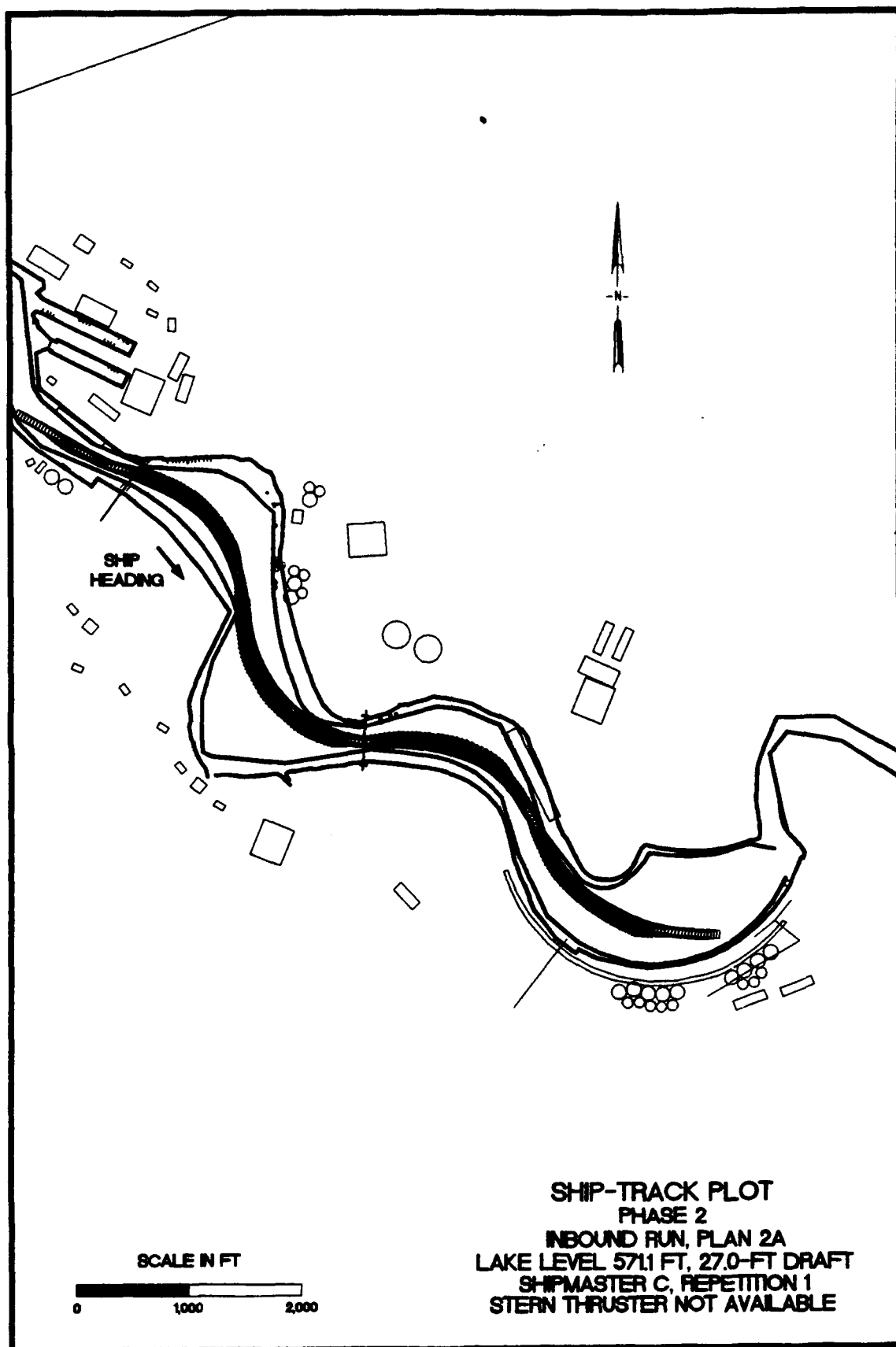


PLATE B96



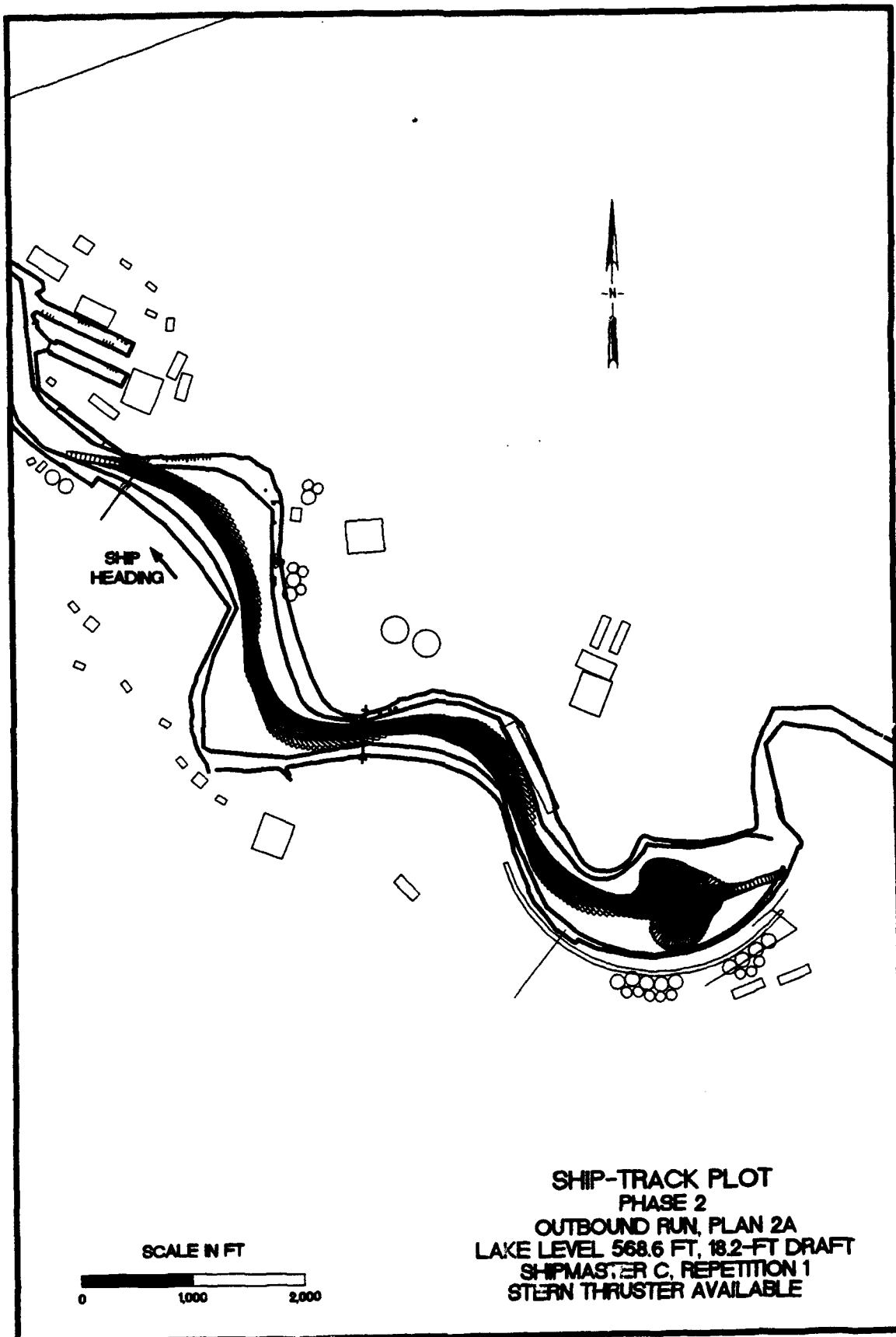
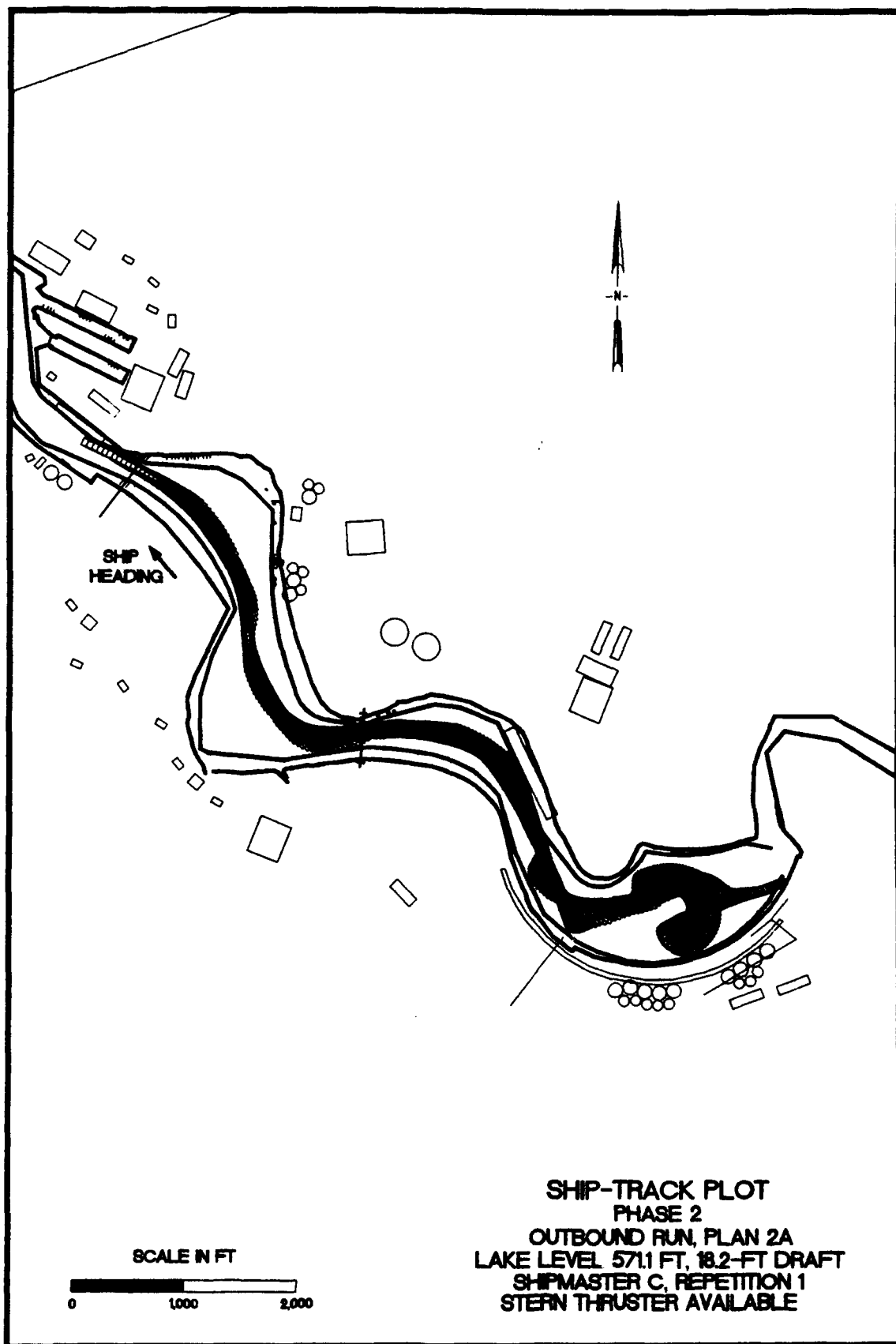


PLATE B98



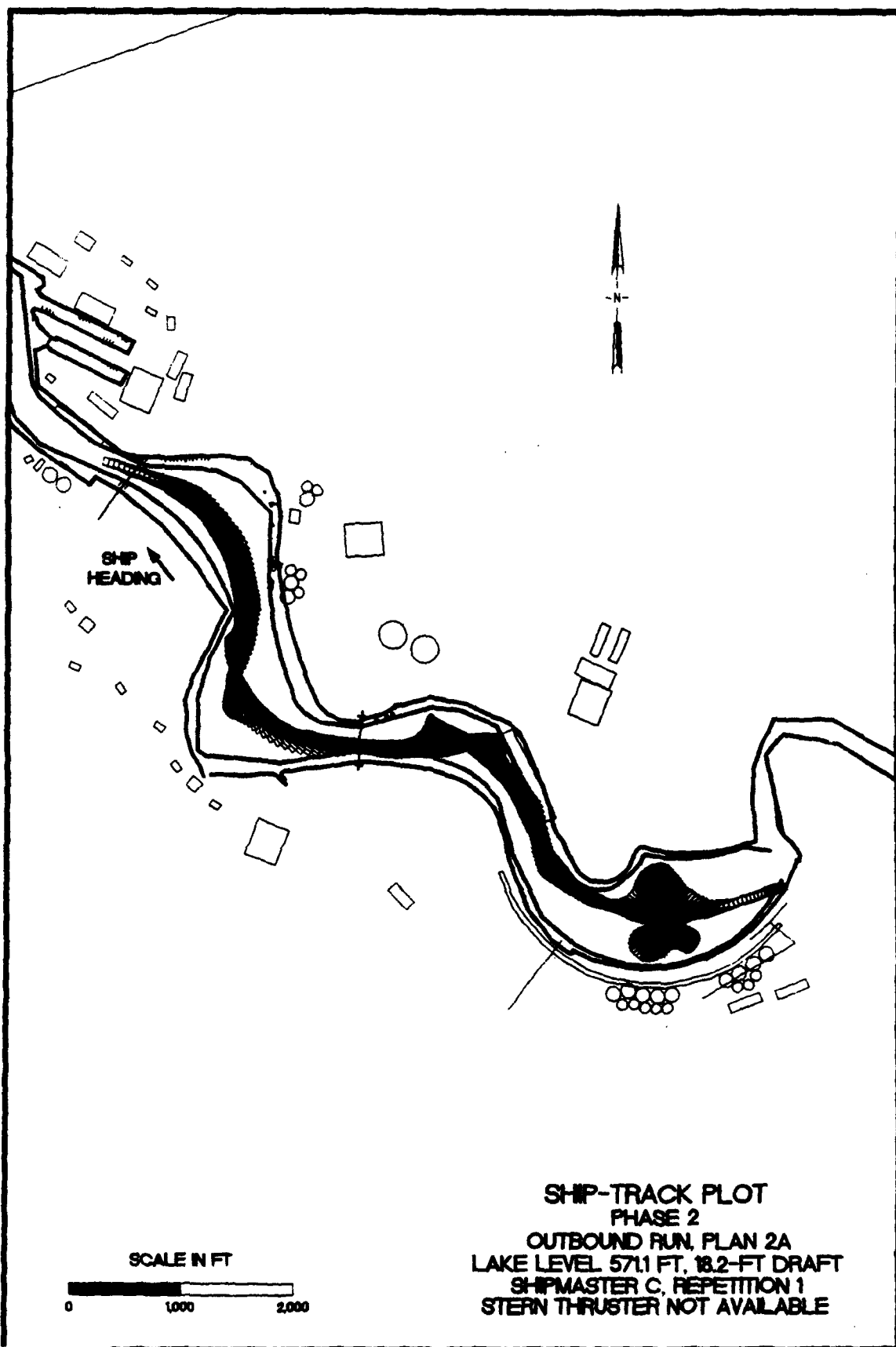
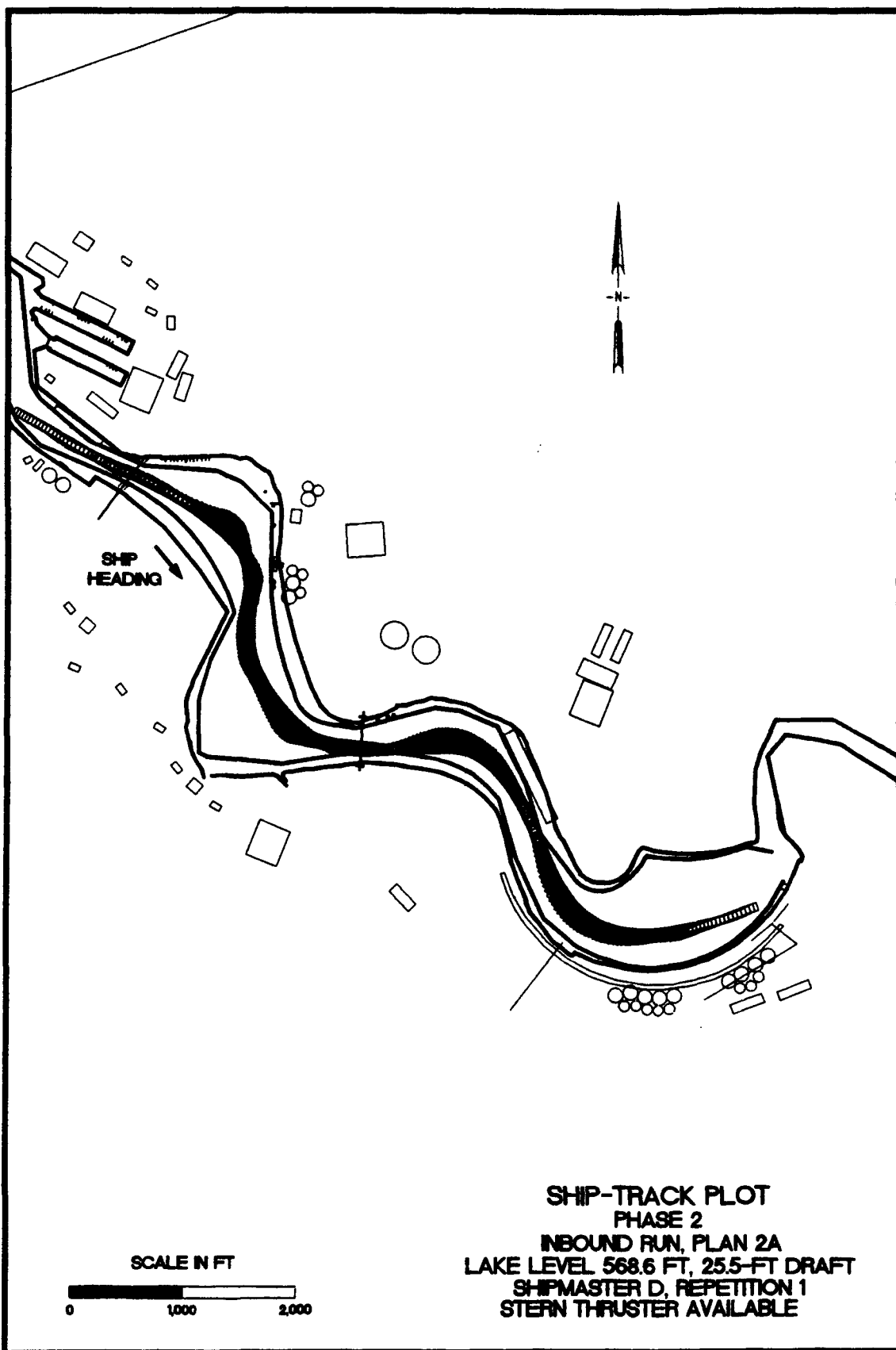


PLATE B100



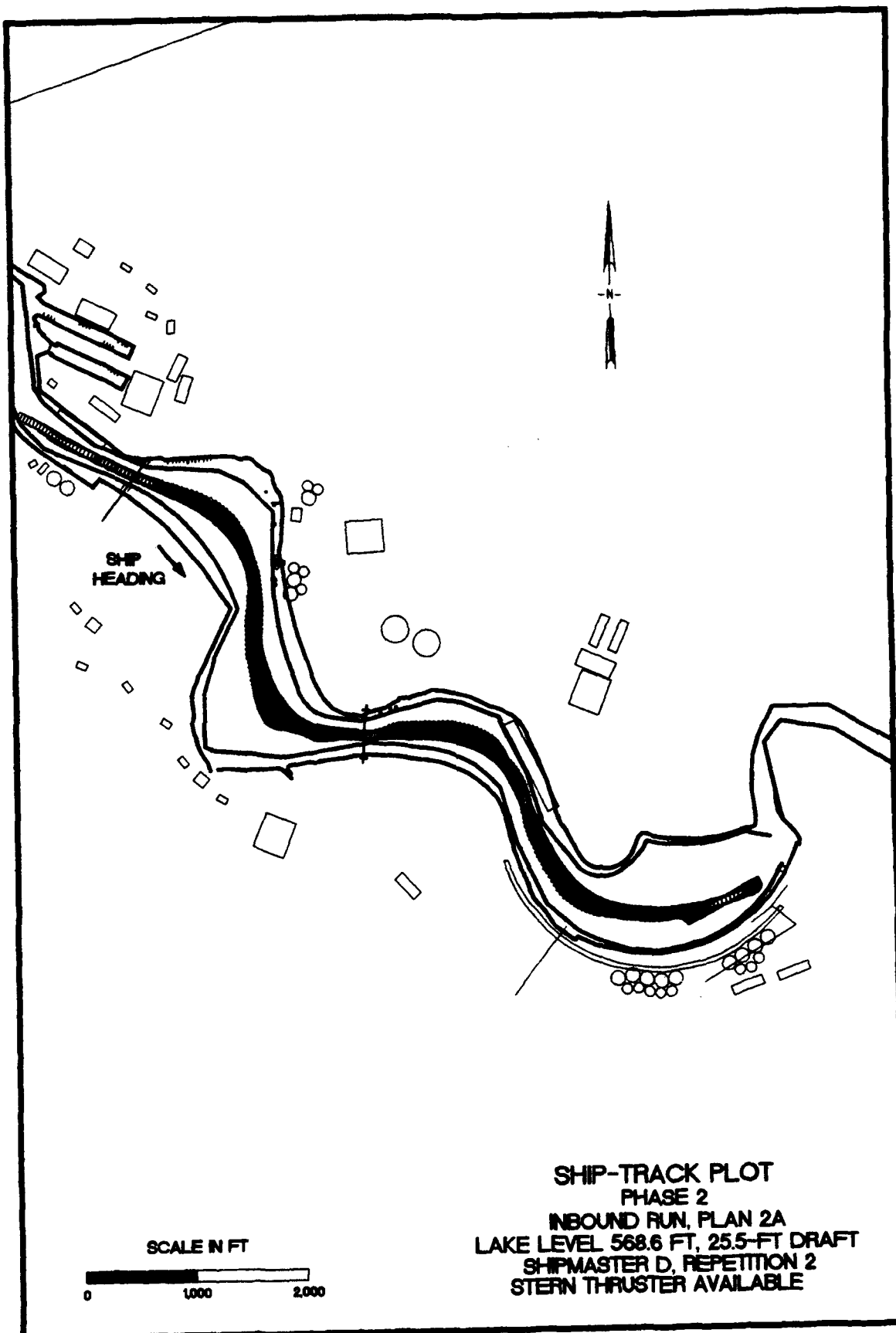
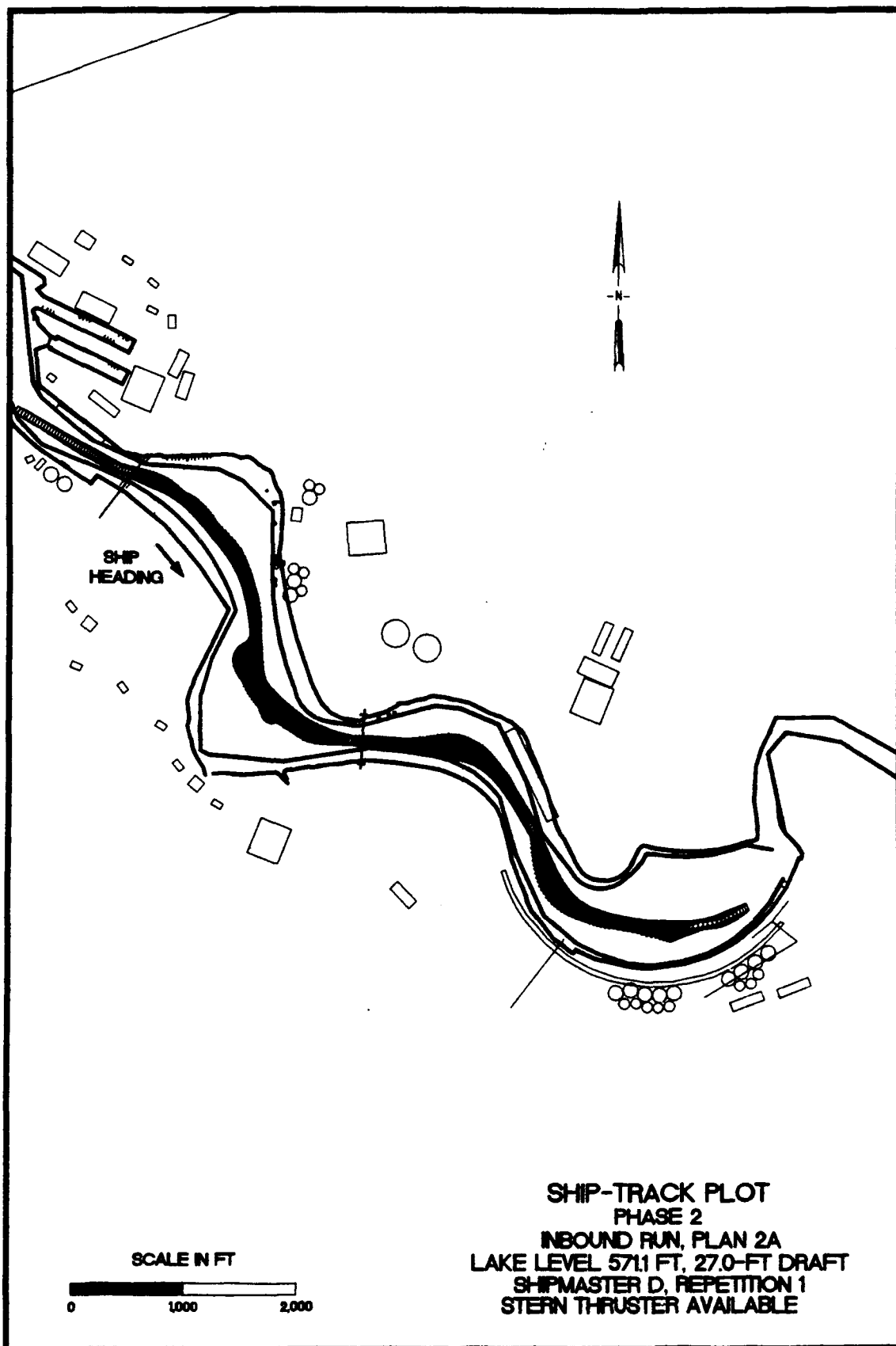


PLATE B102



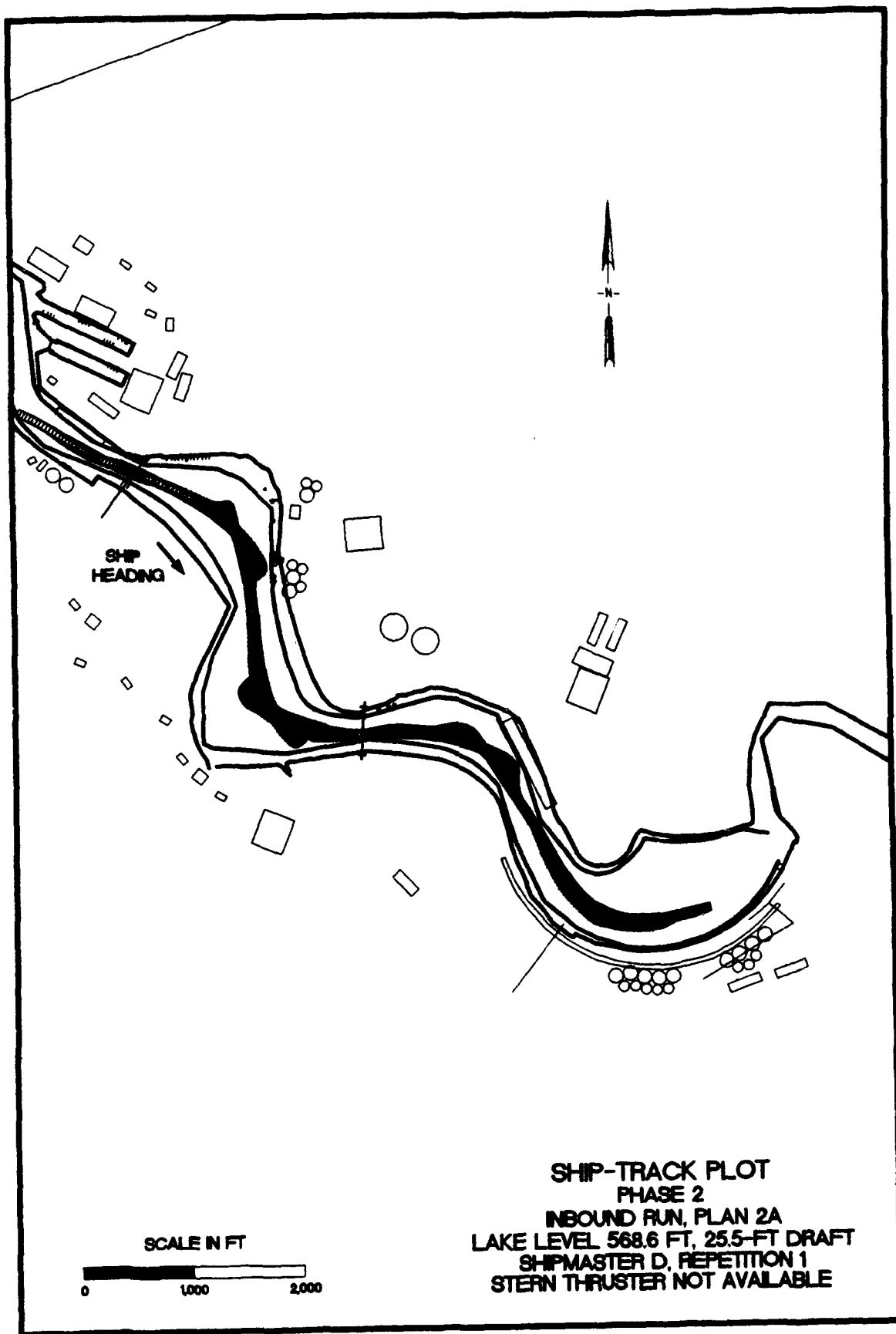
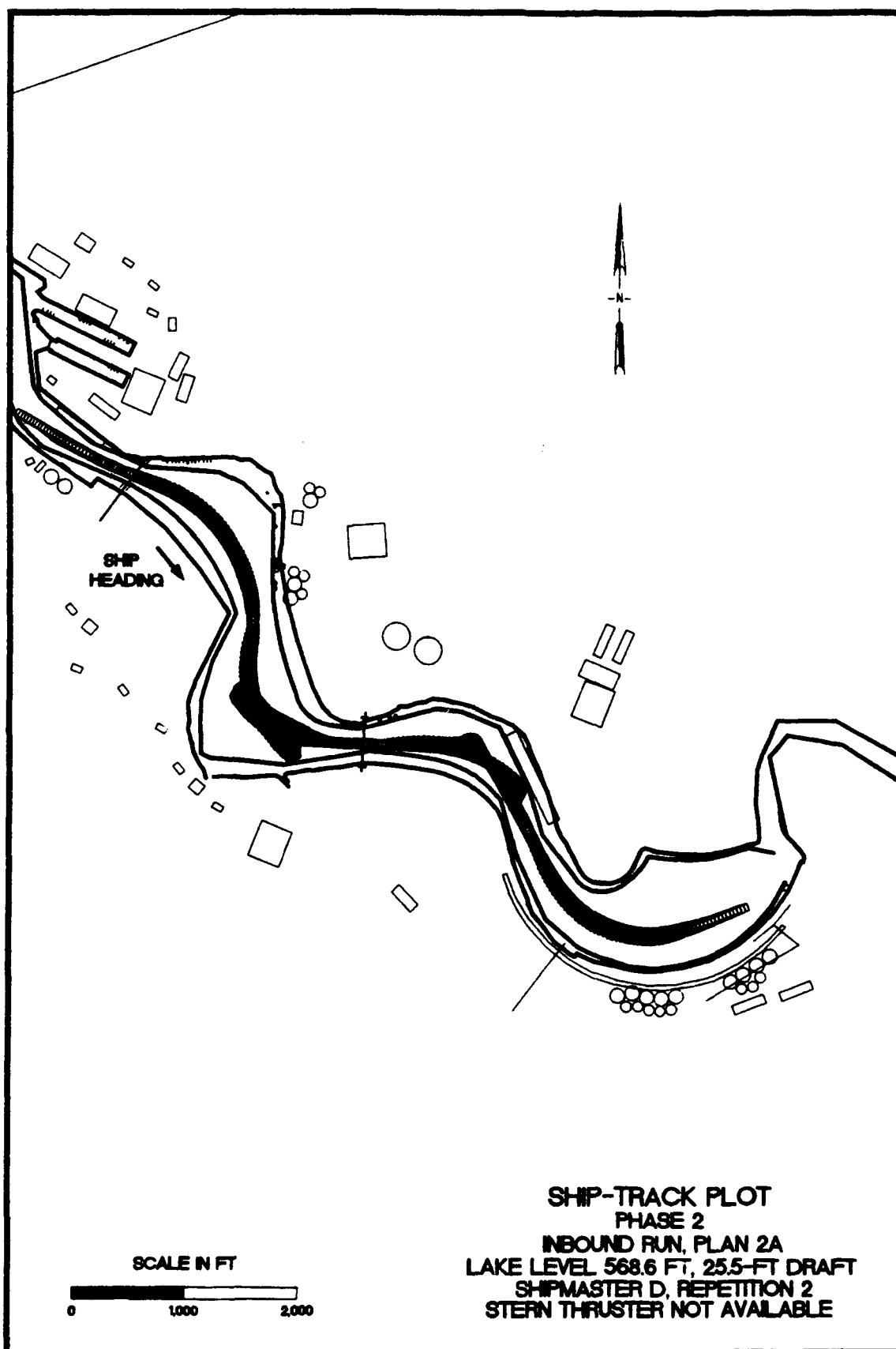


PLATE B104



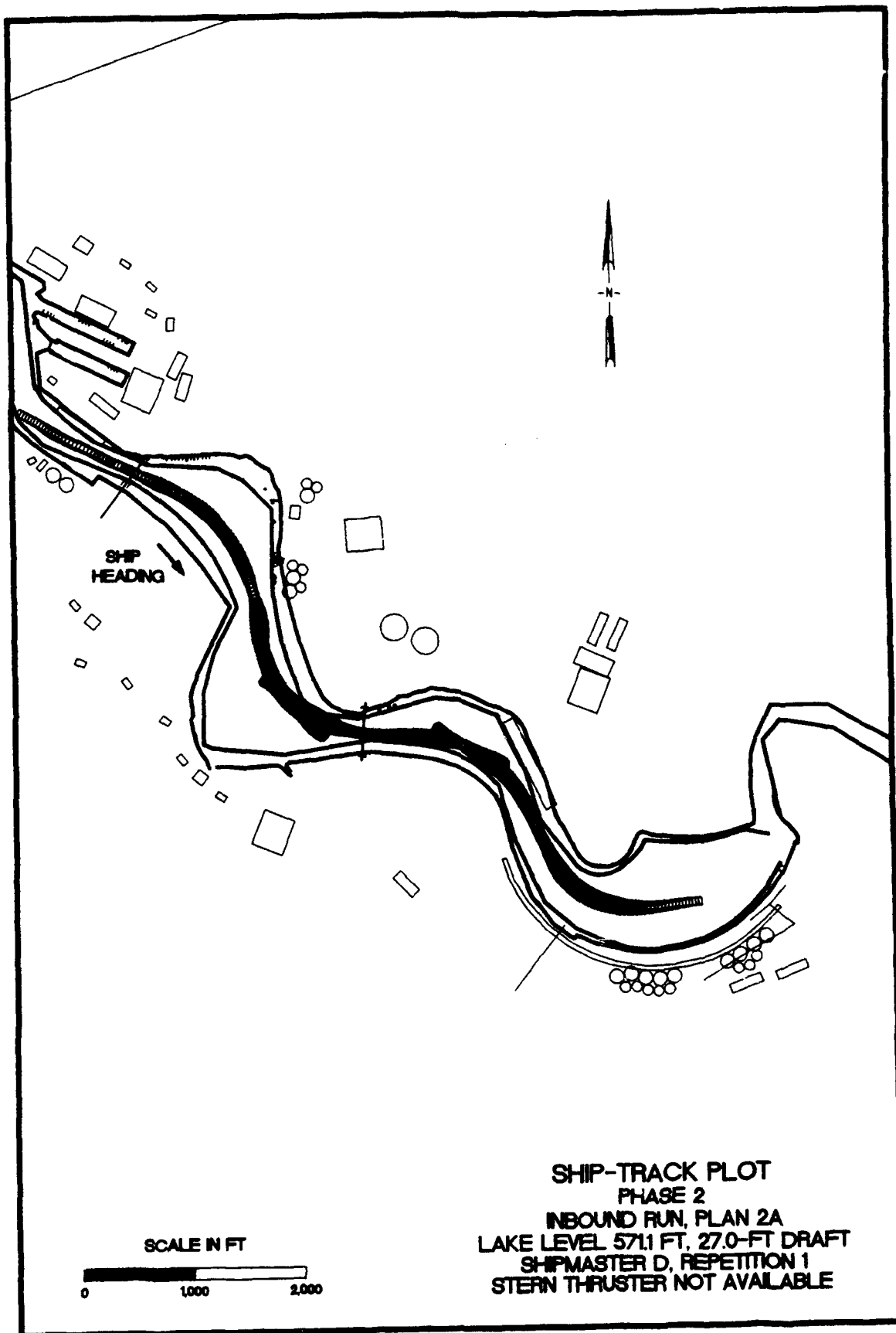


PLATE B106

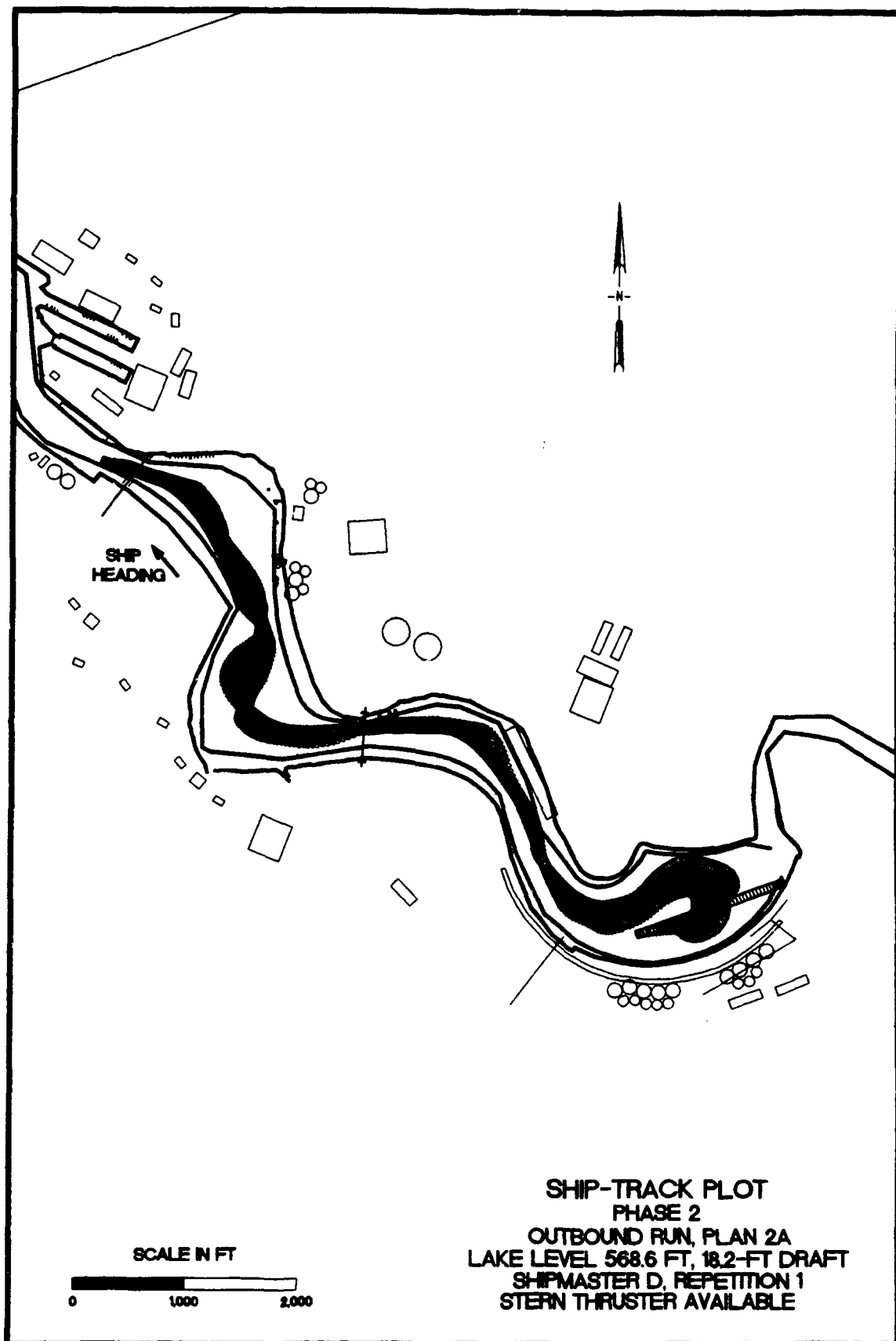


PLATE B107

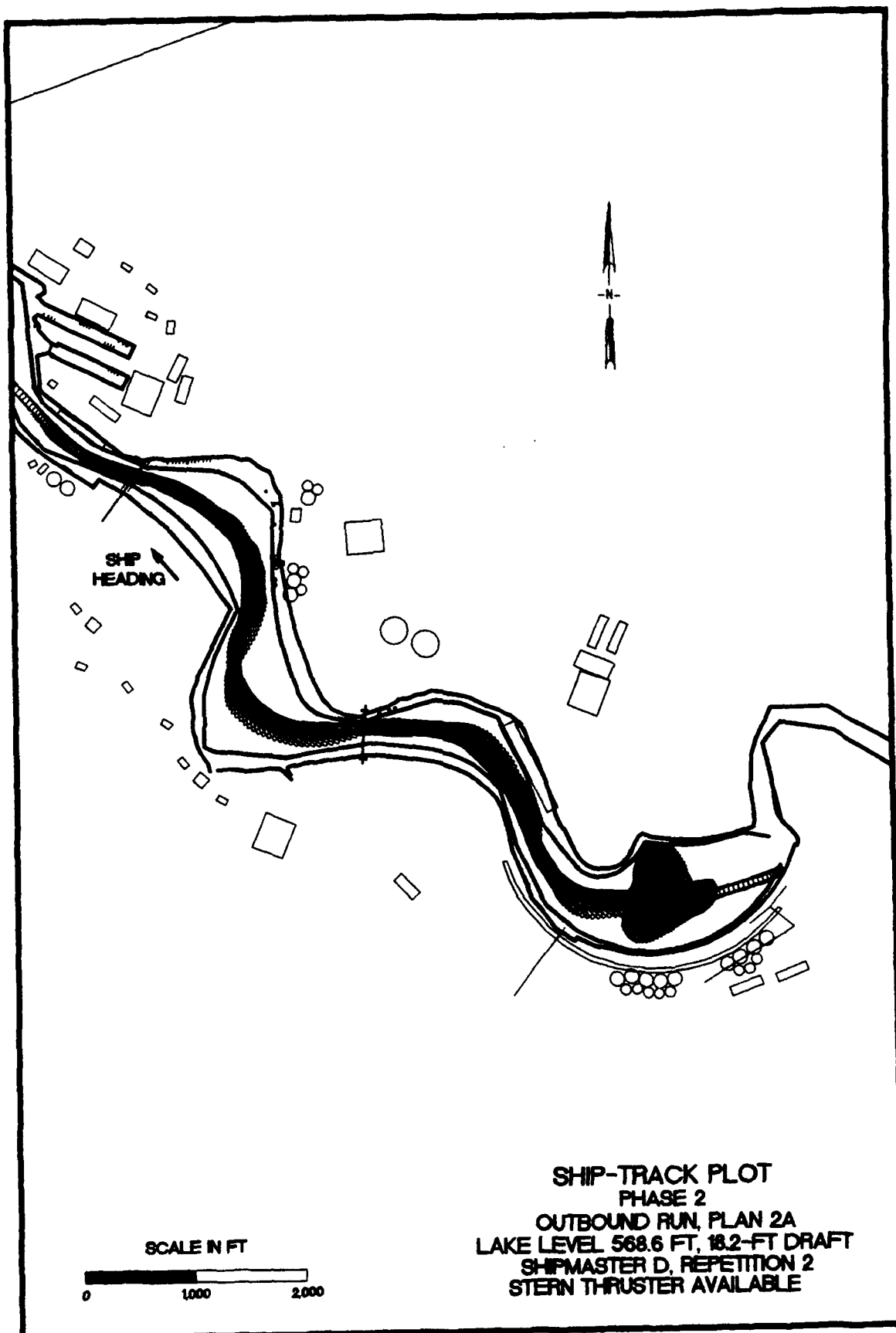
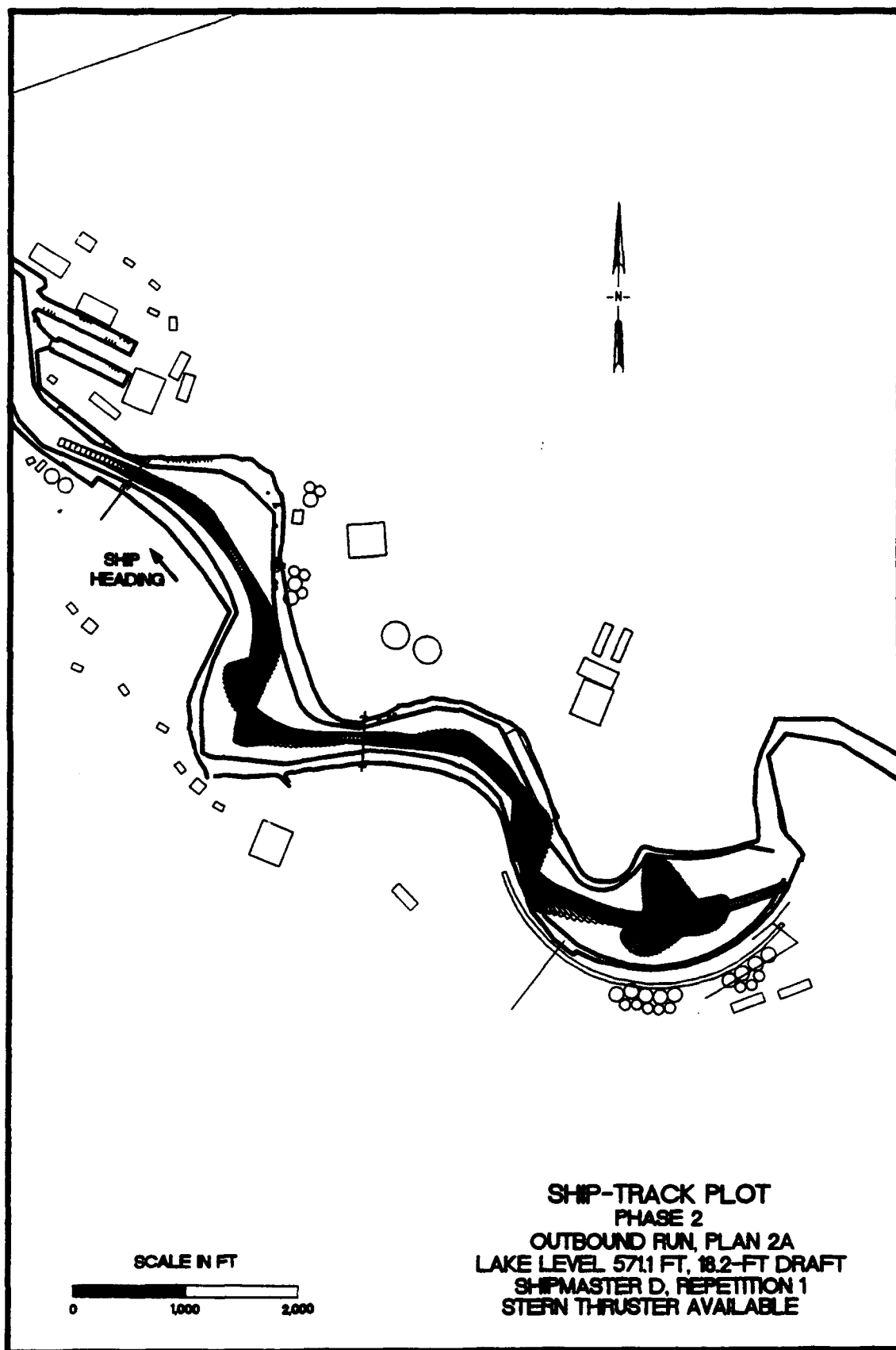


PLATE B108



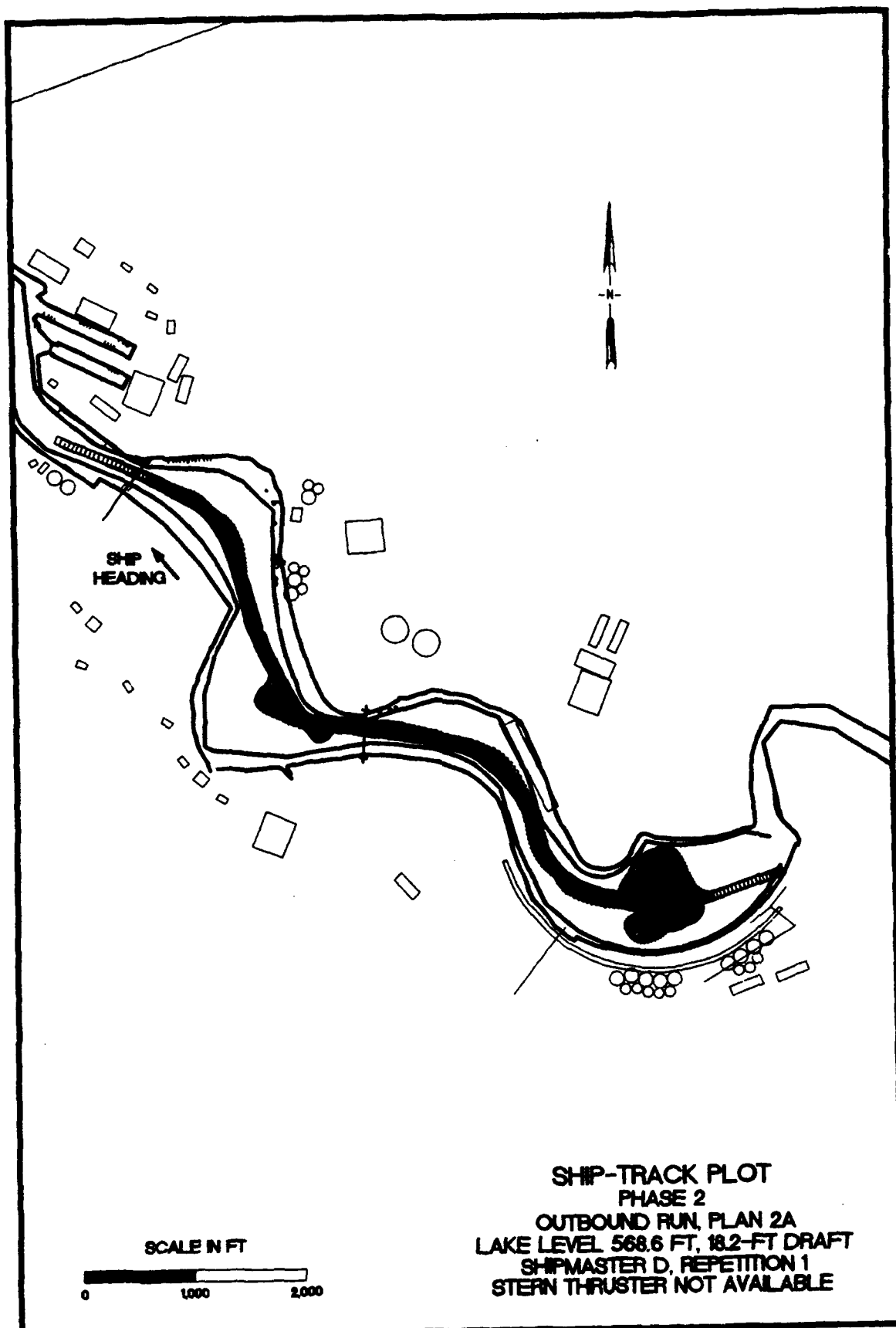


PLATE B110

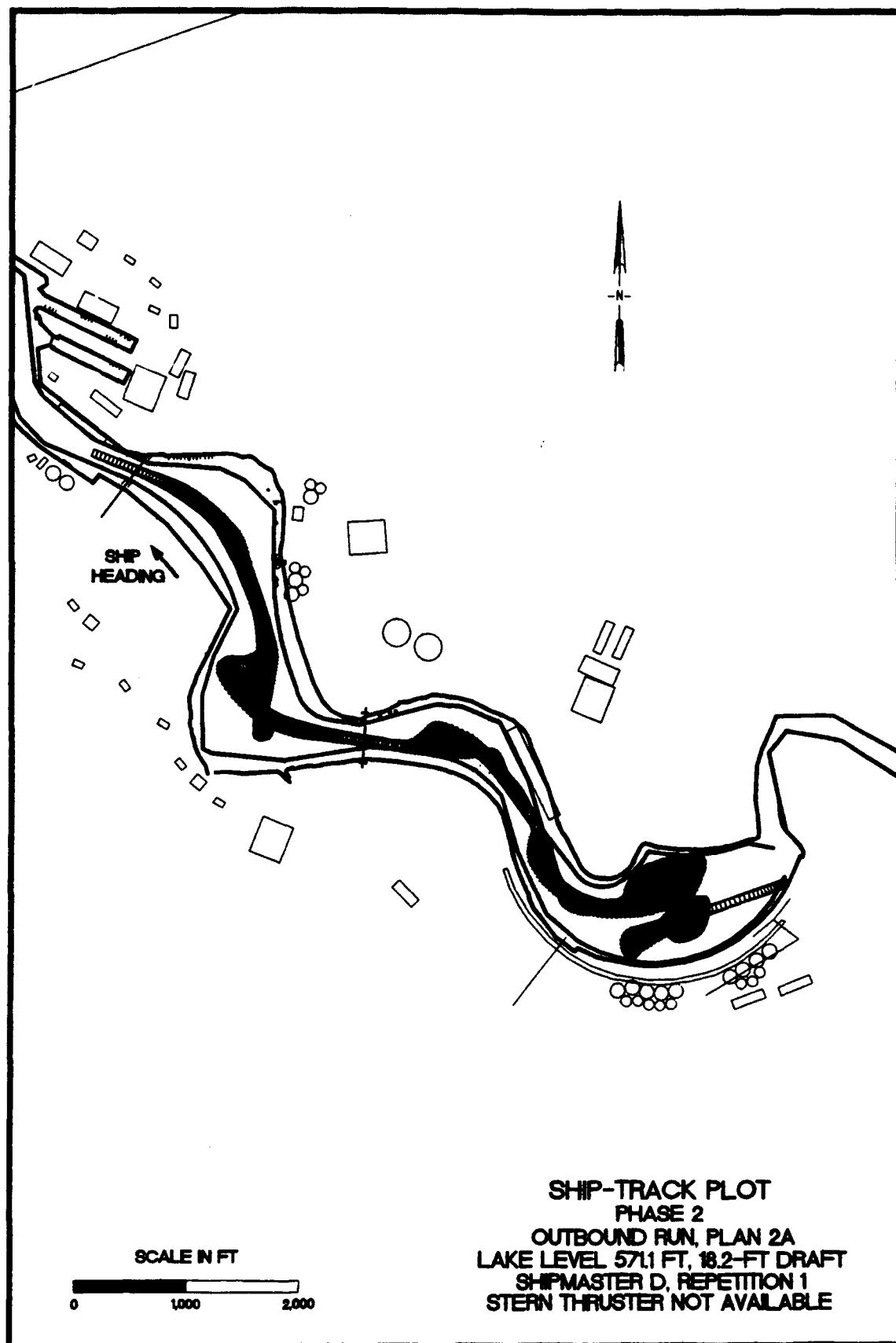


PLATE B111

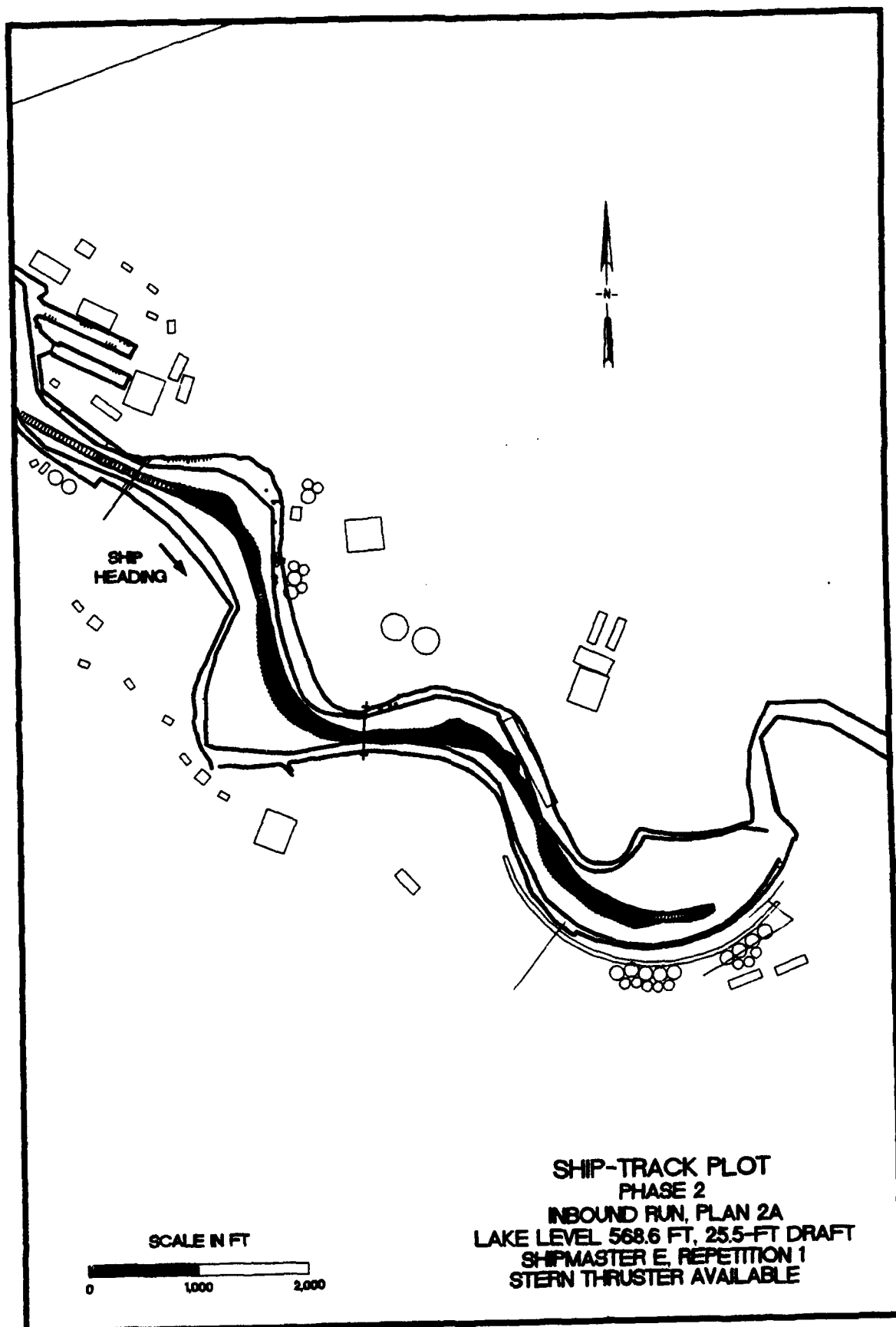
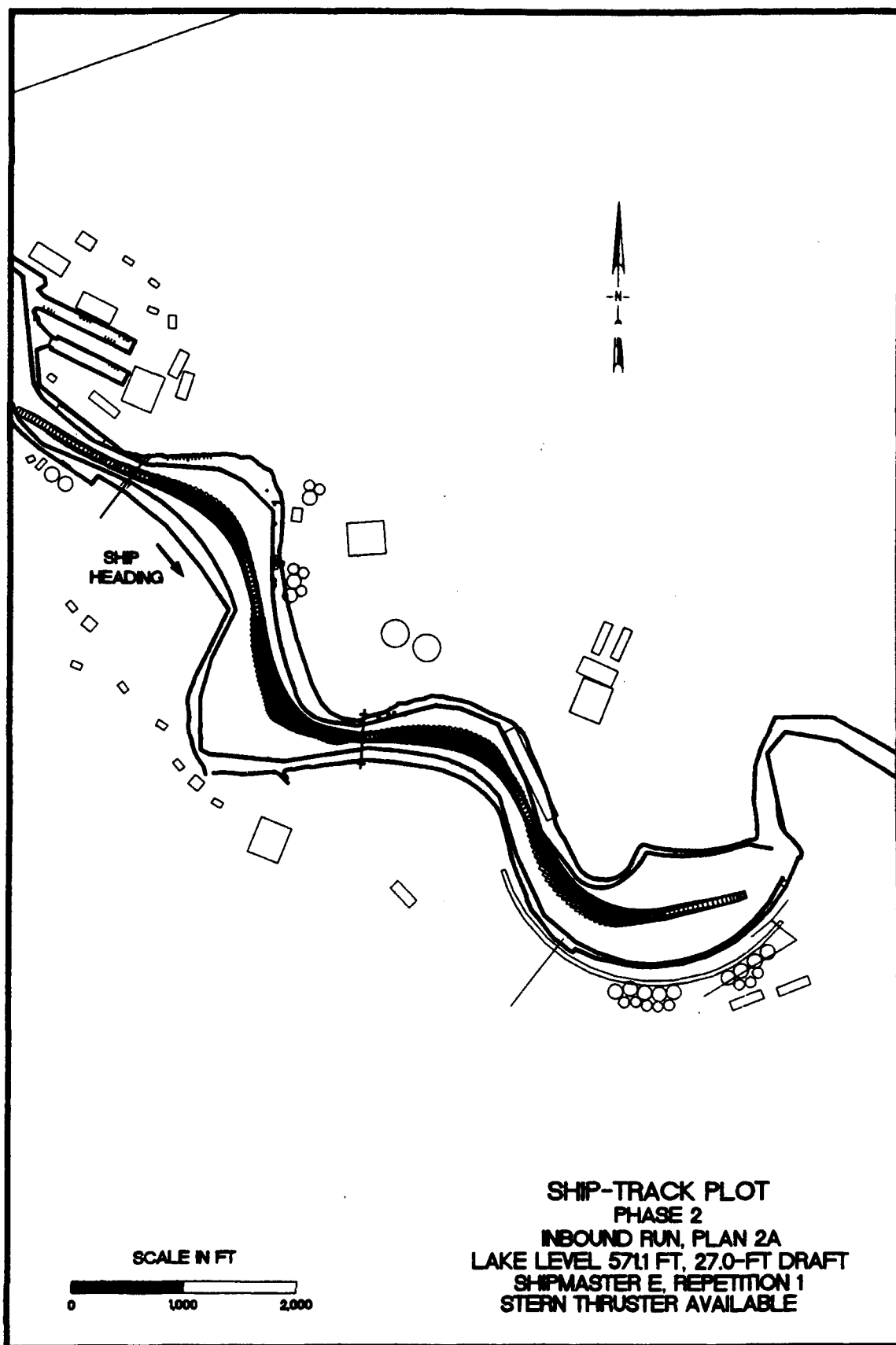


PLATE B112



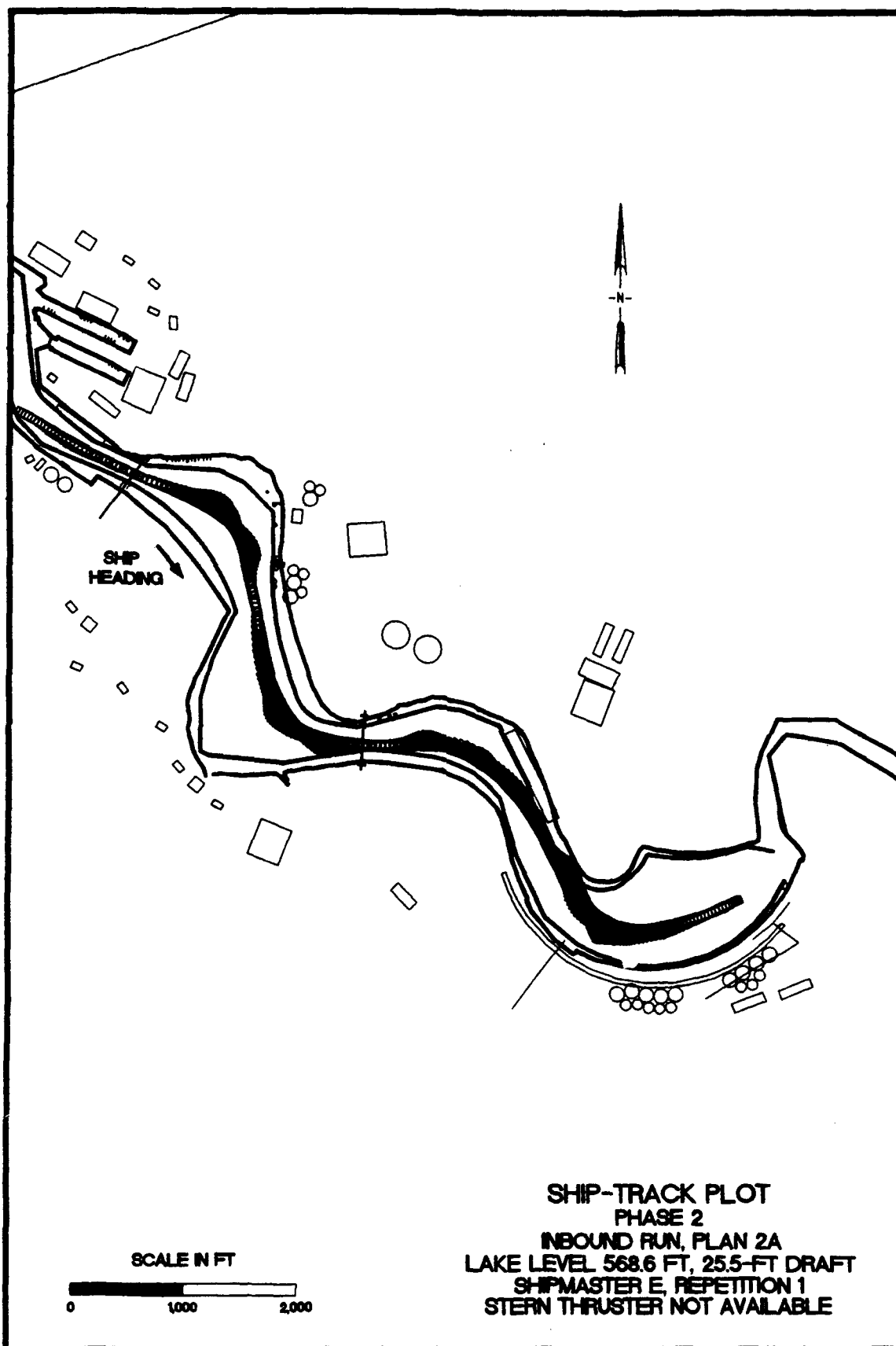
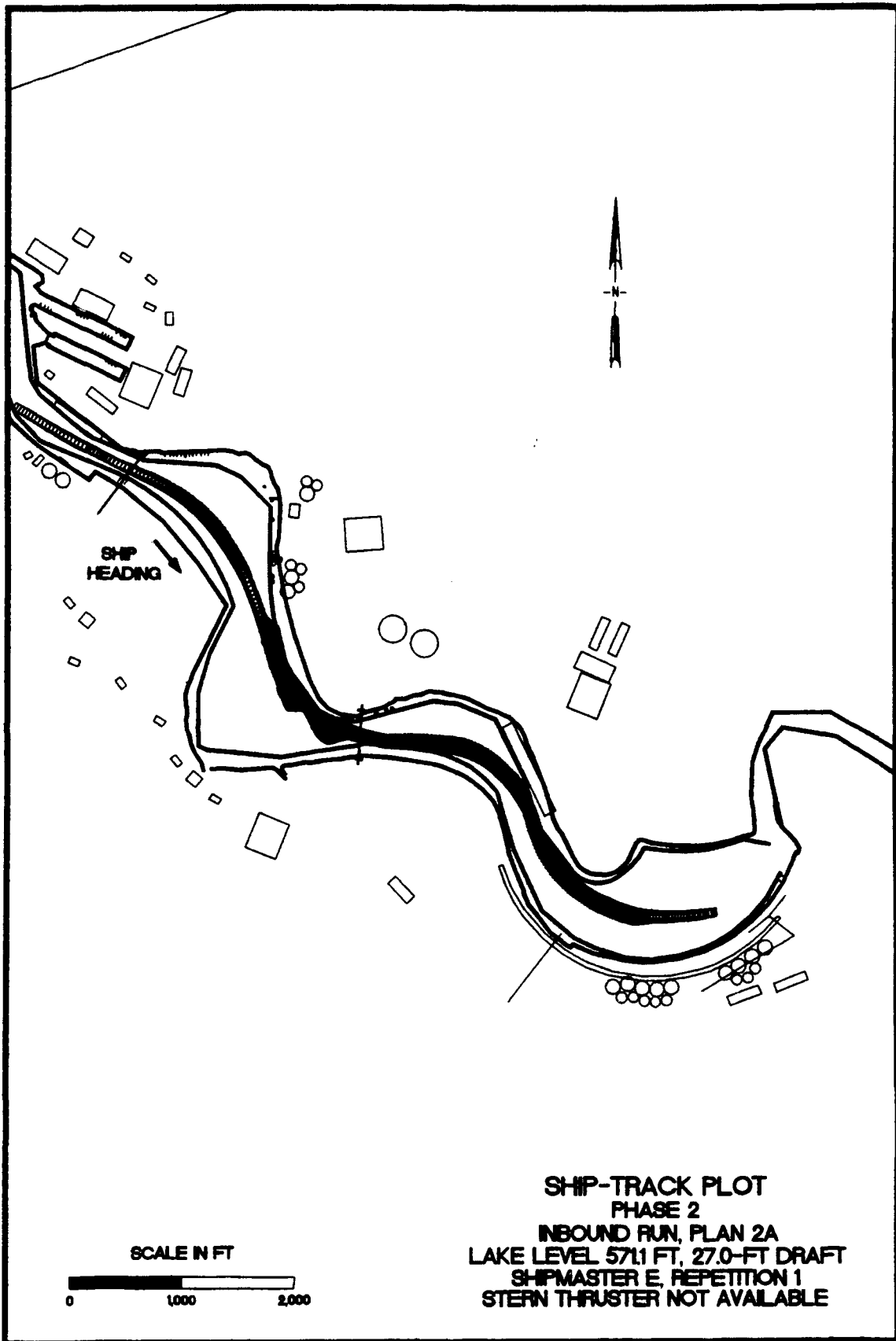


PLATE B114



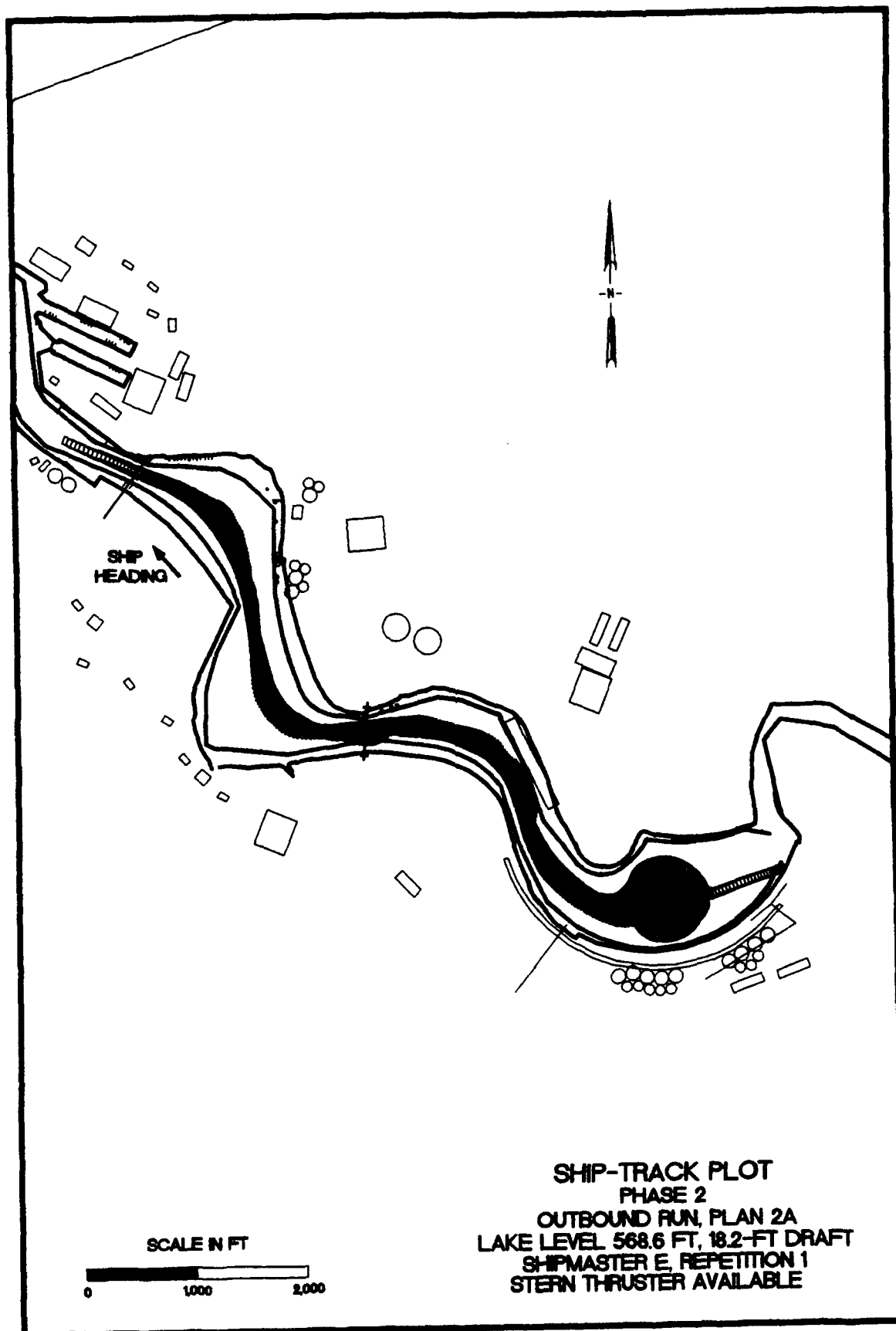
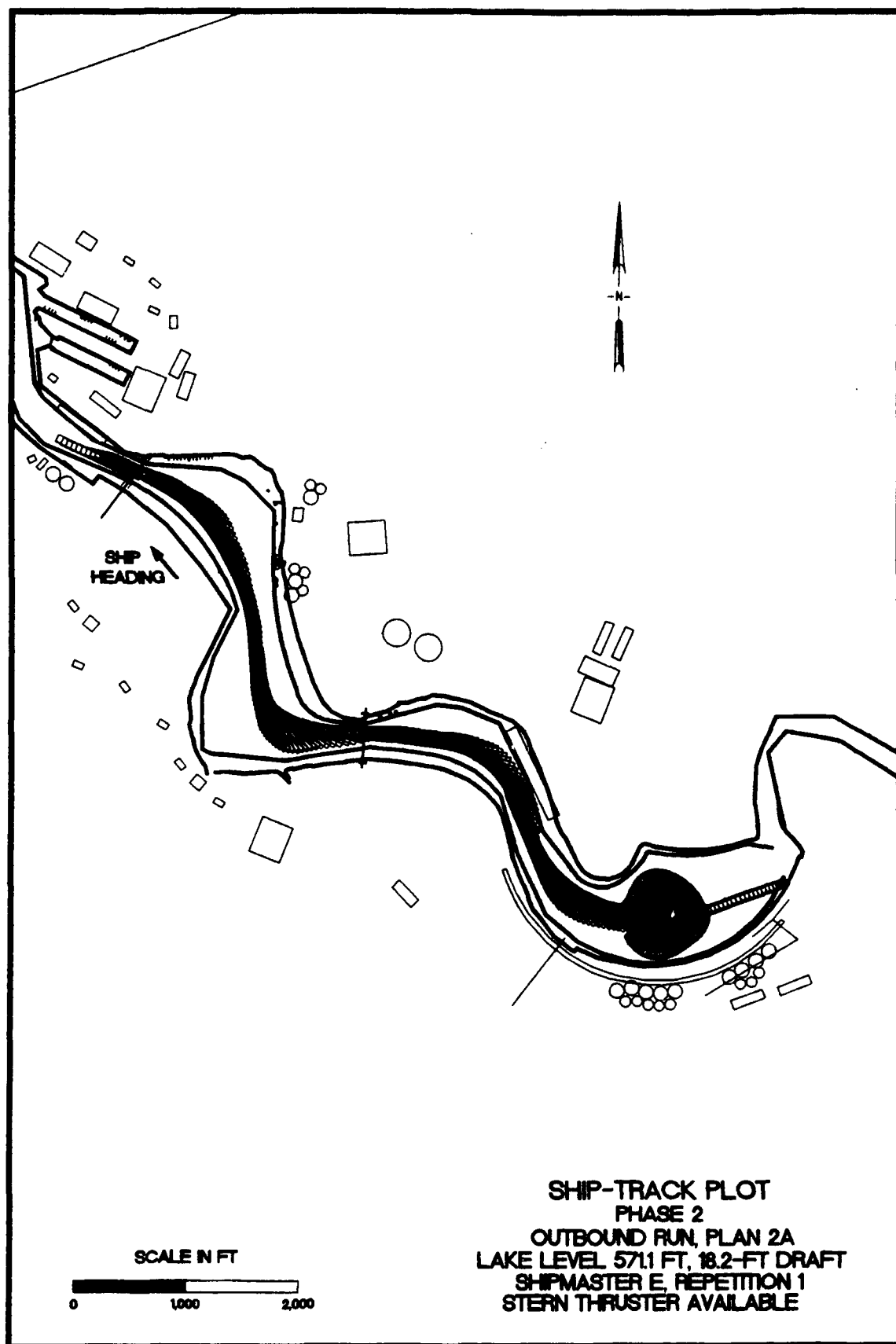


PLATE B116



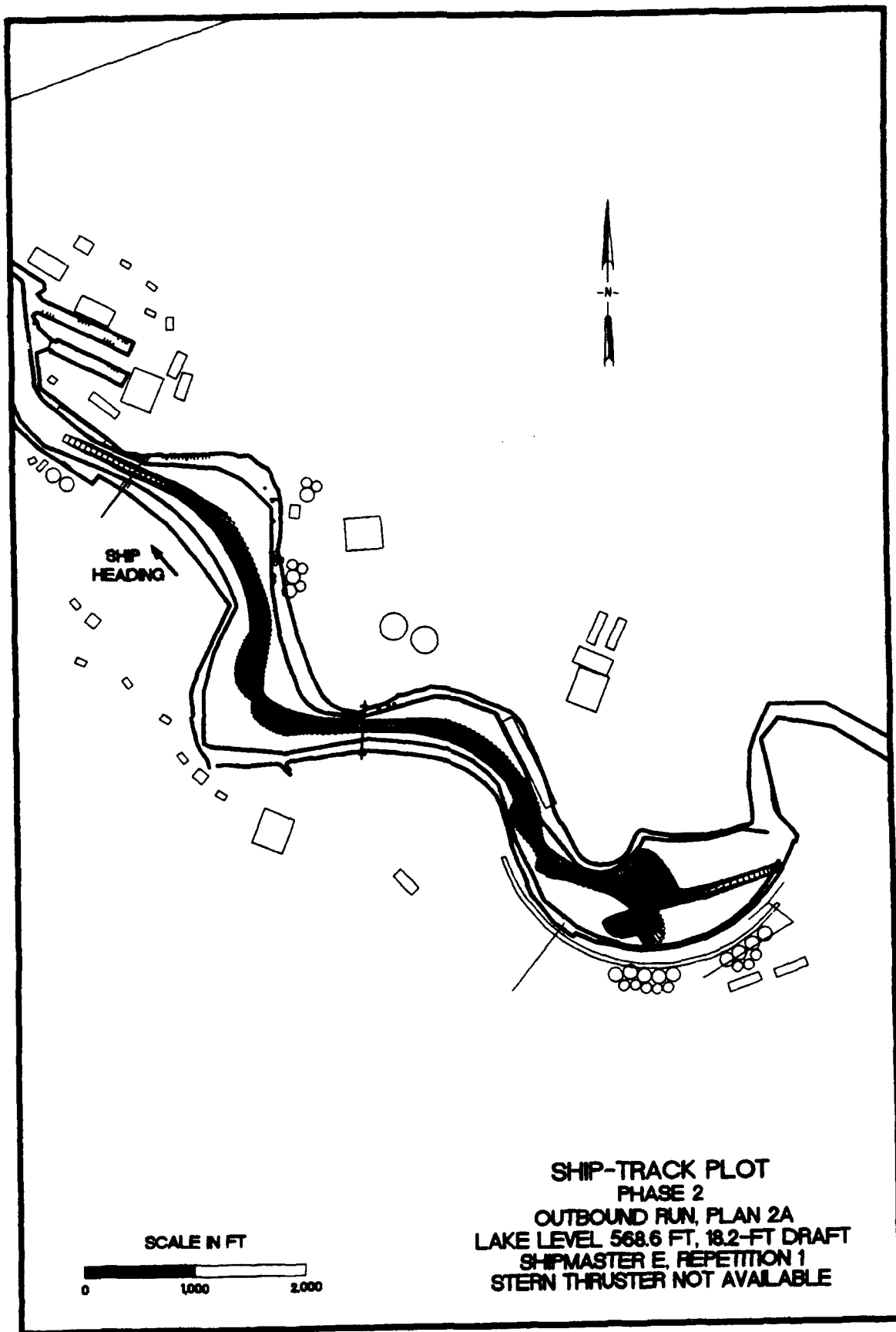
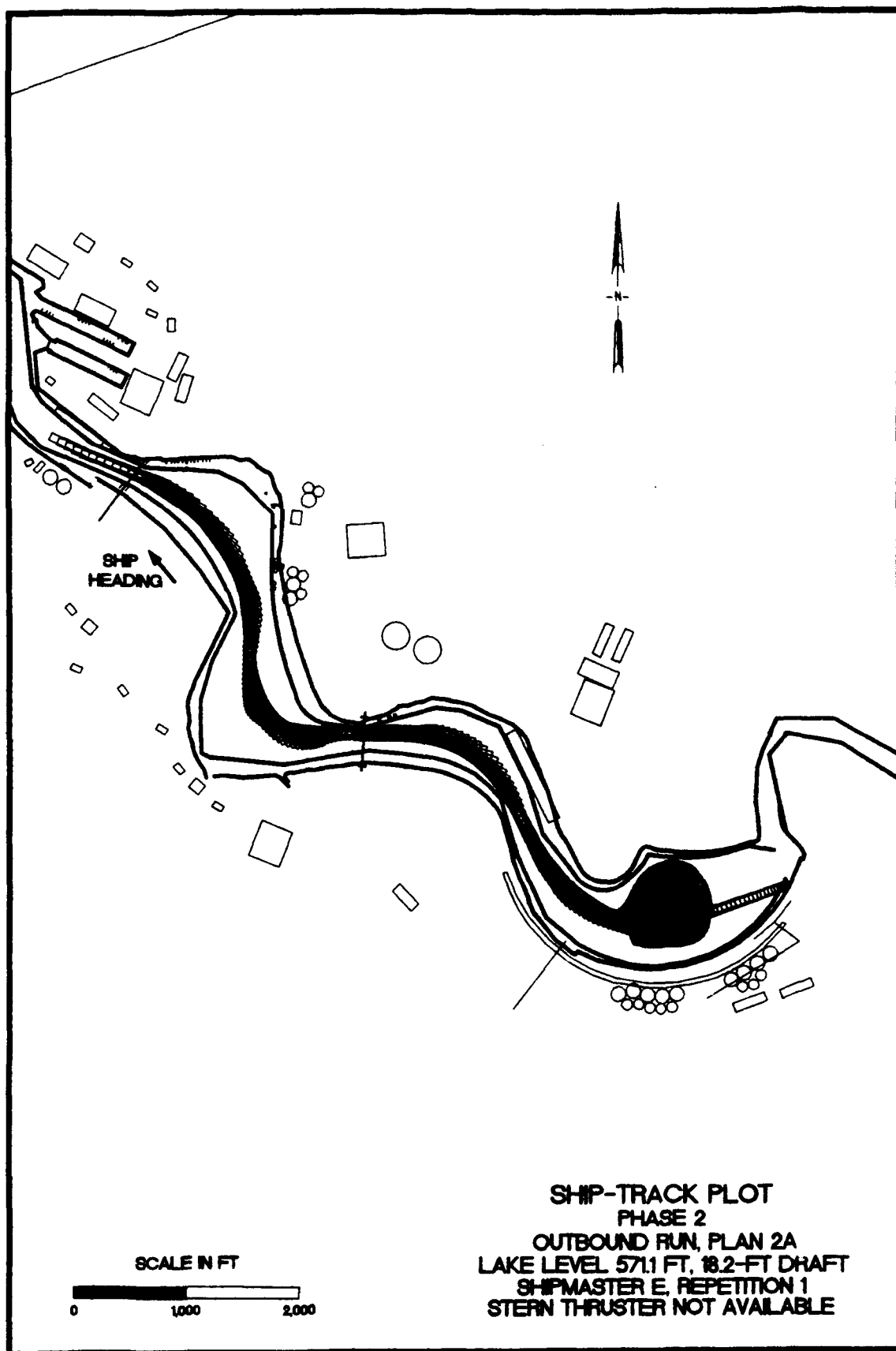


PLATE B118



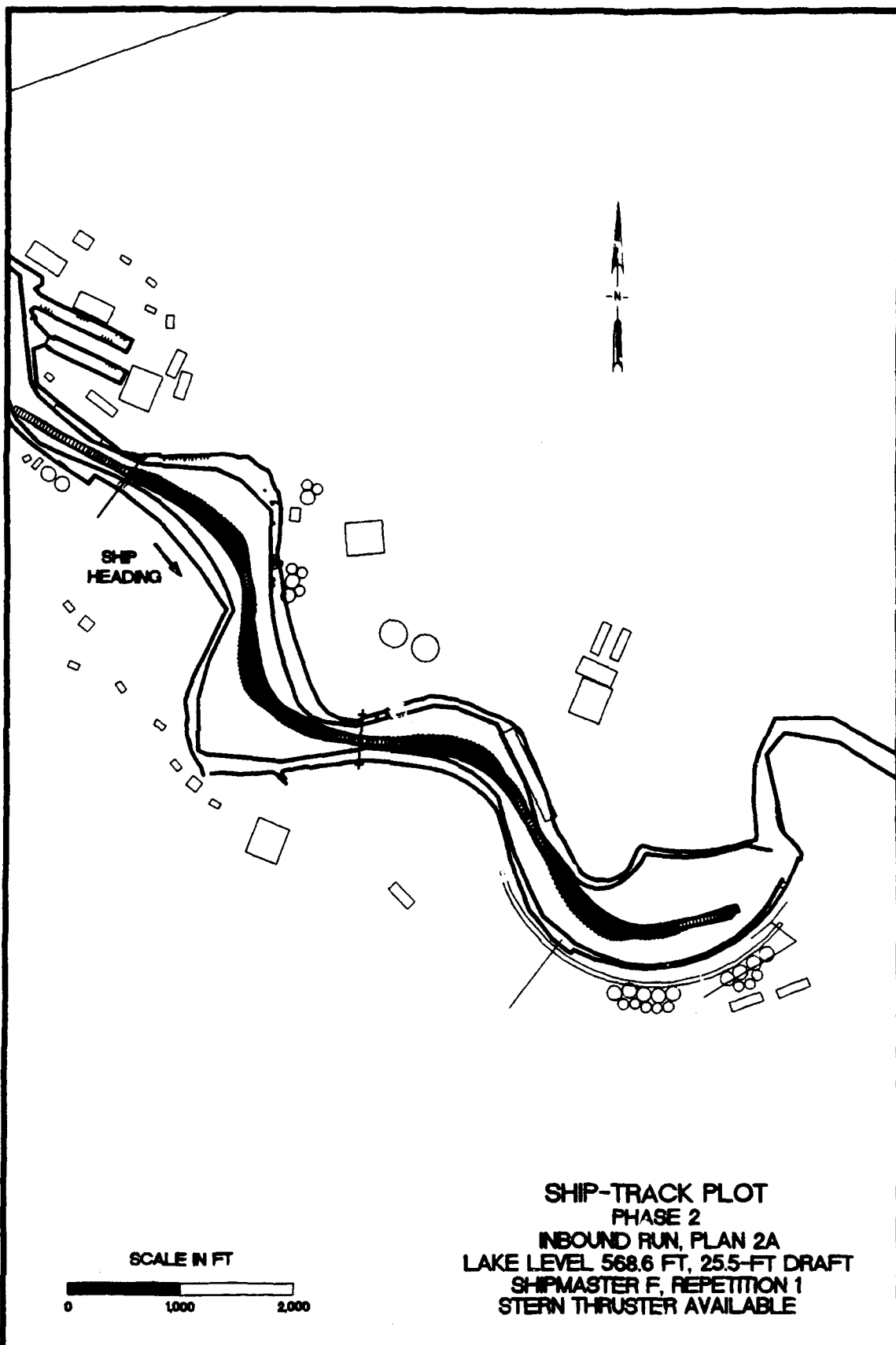


PLATE B120

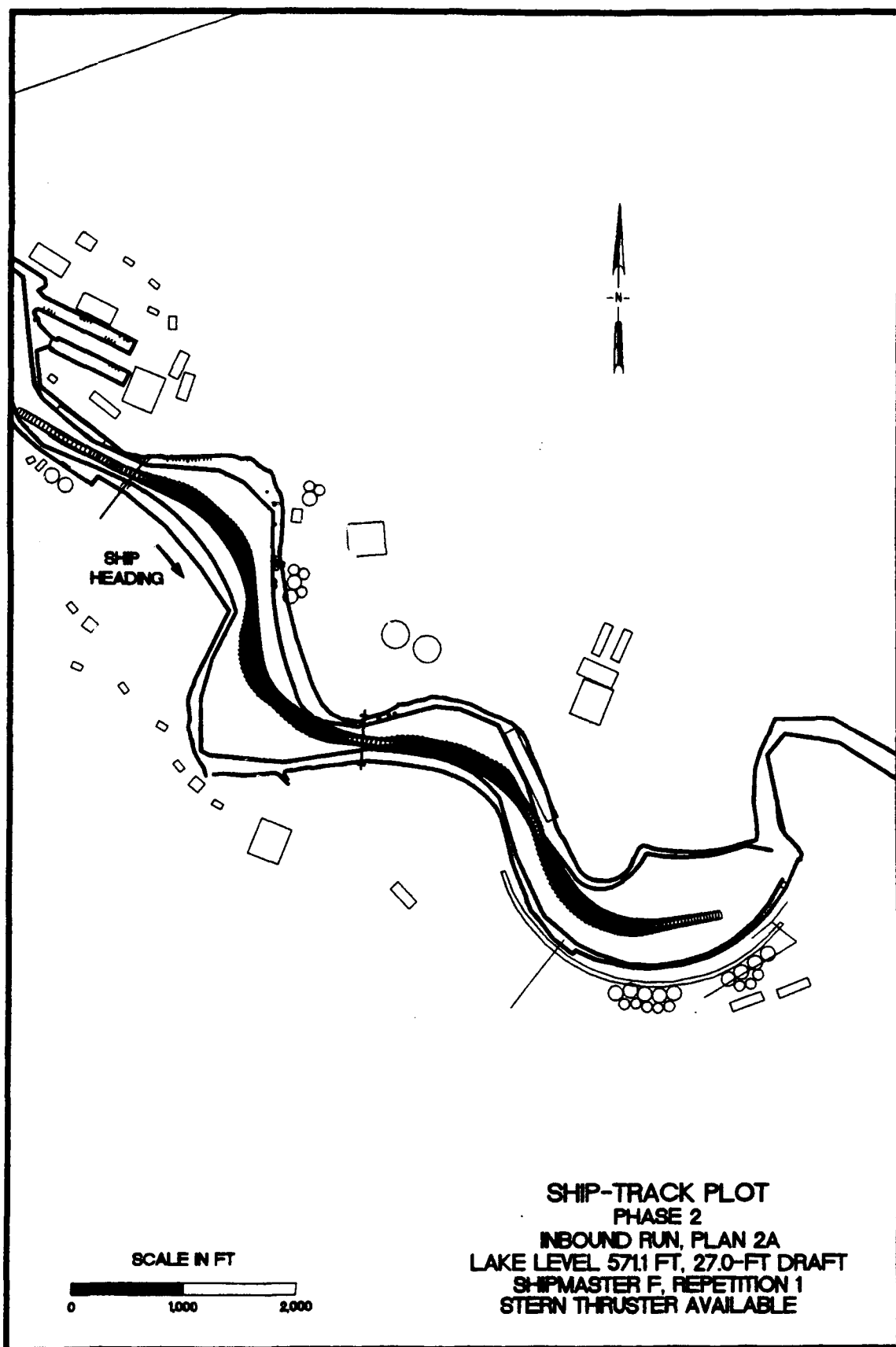


PLATE B121

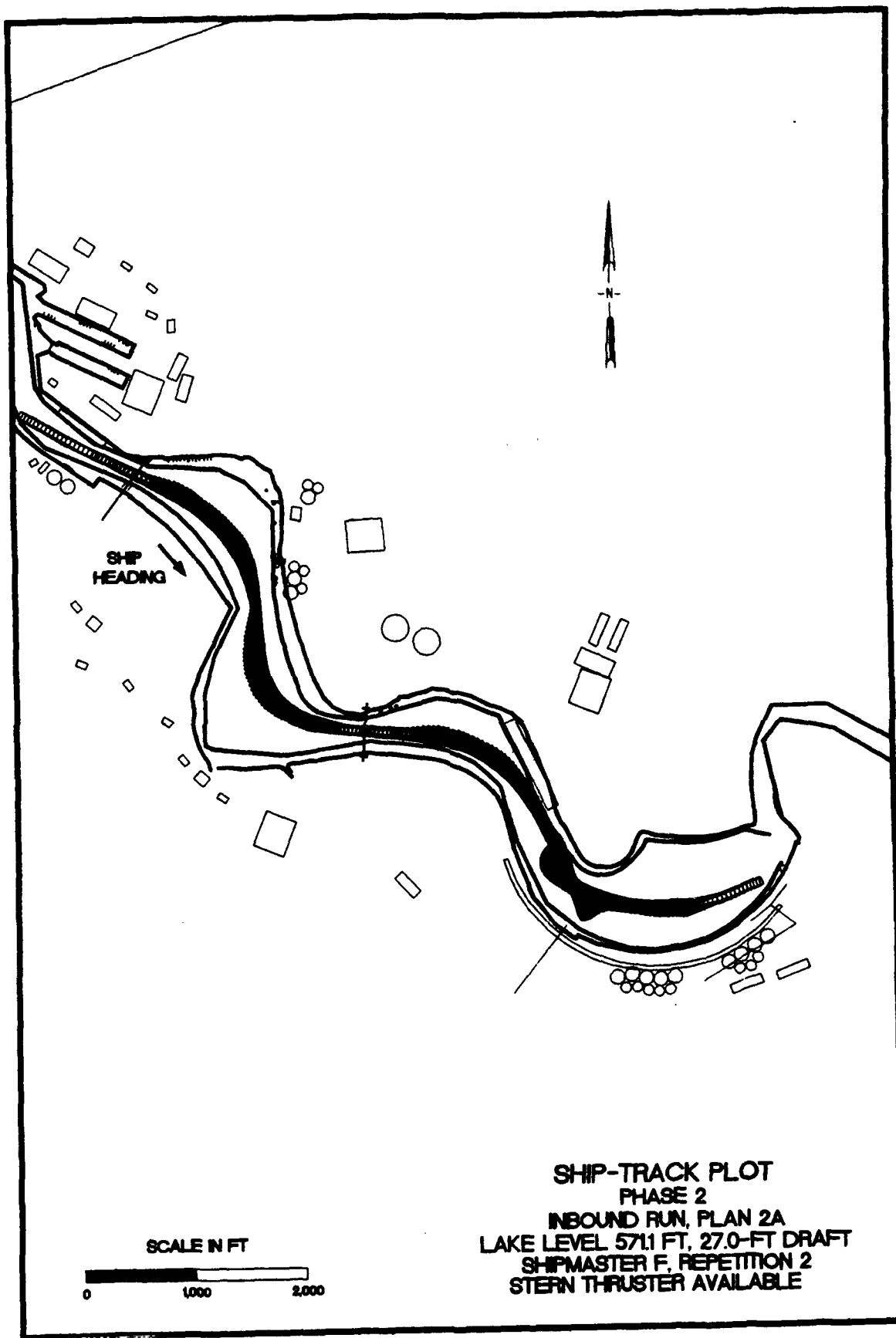


PLATE B122

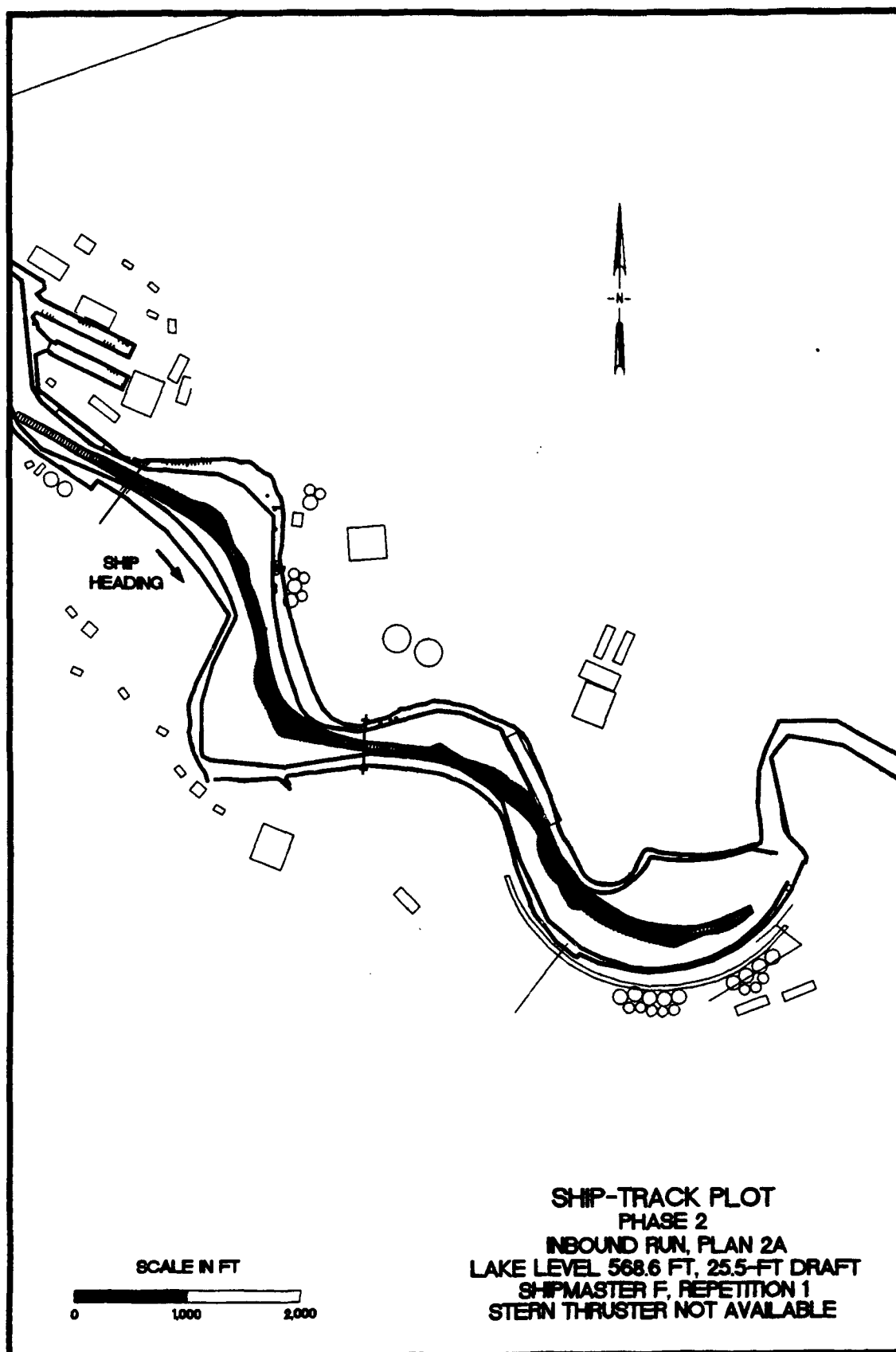


PLATE B123

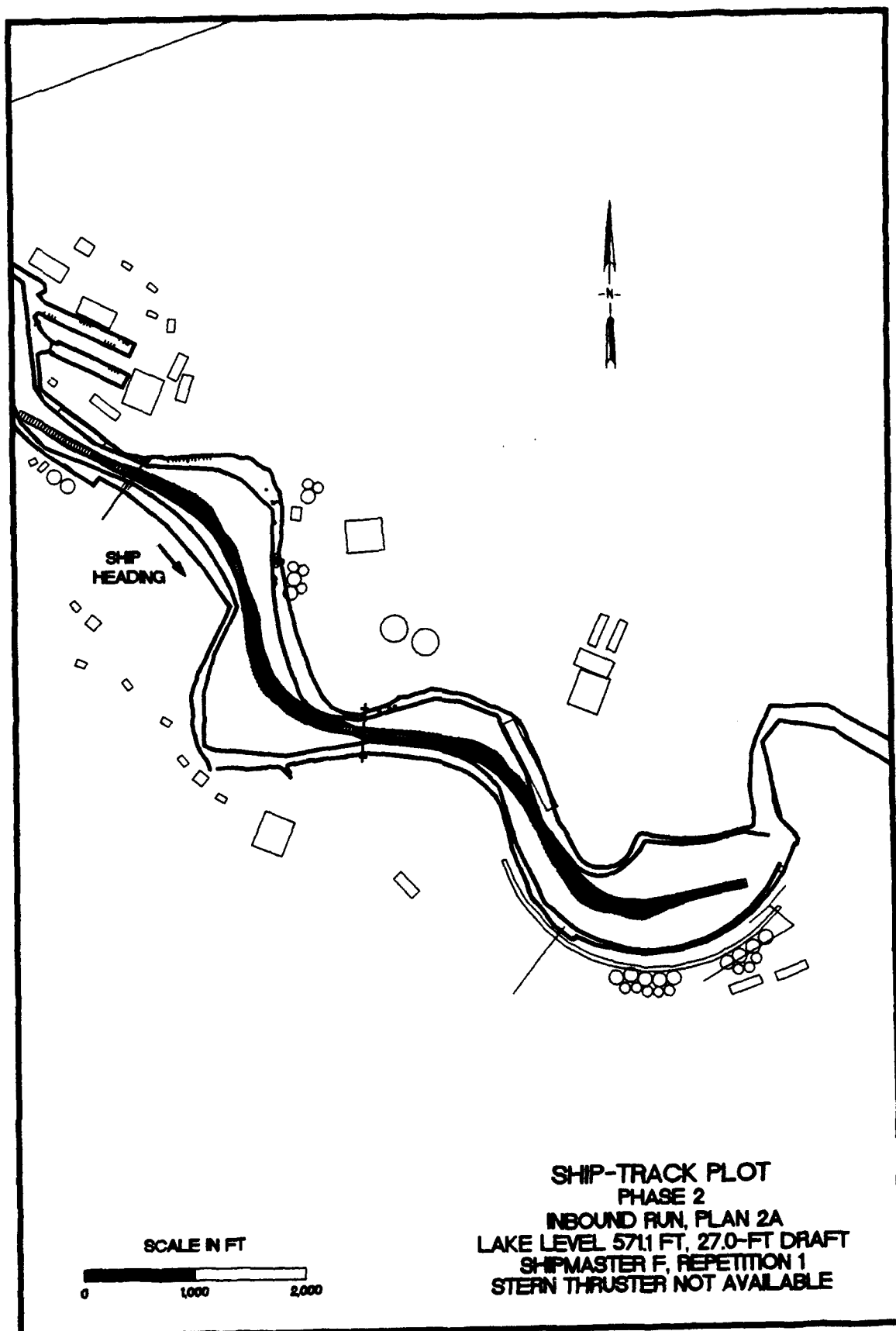
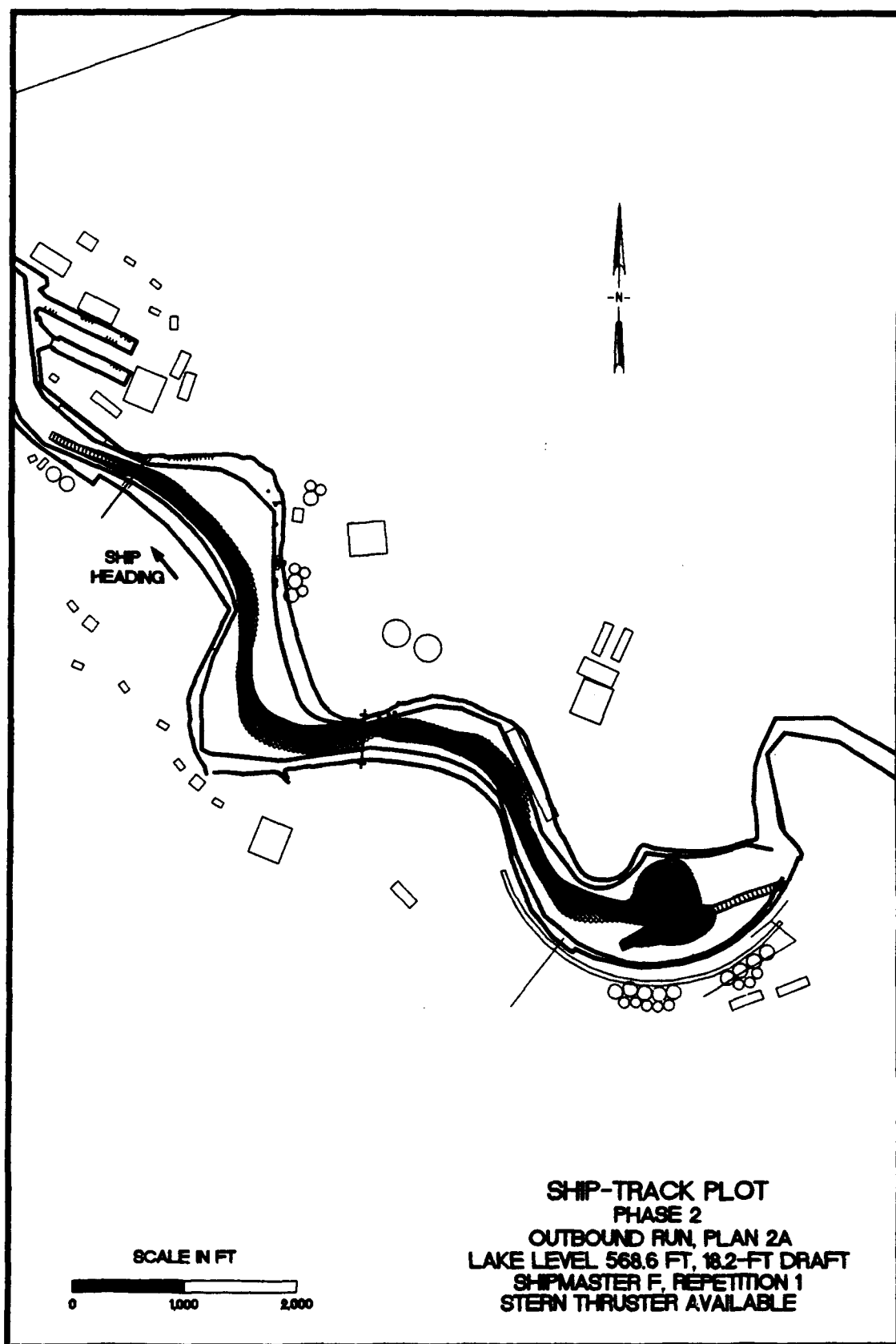


PLATE B124



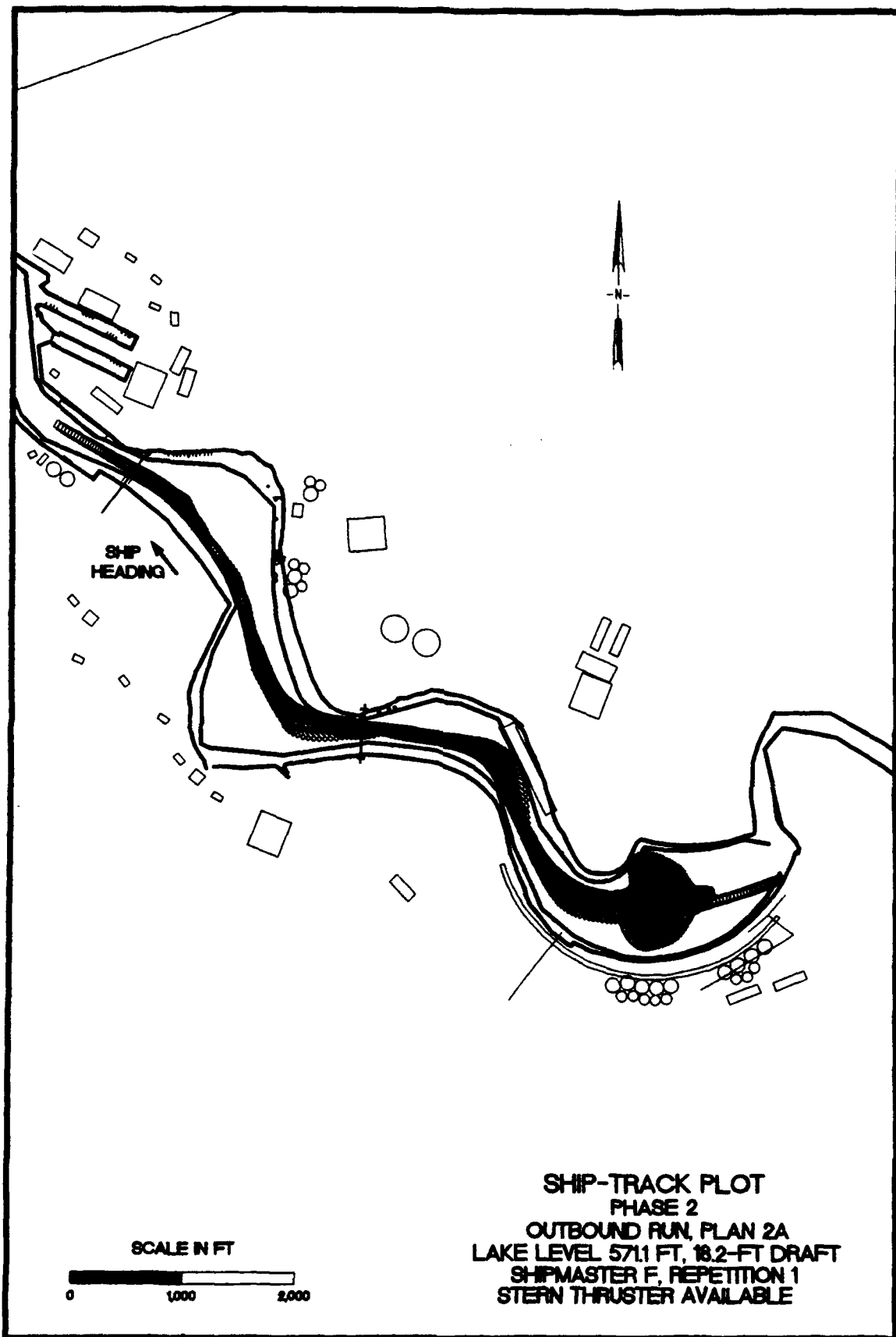
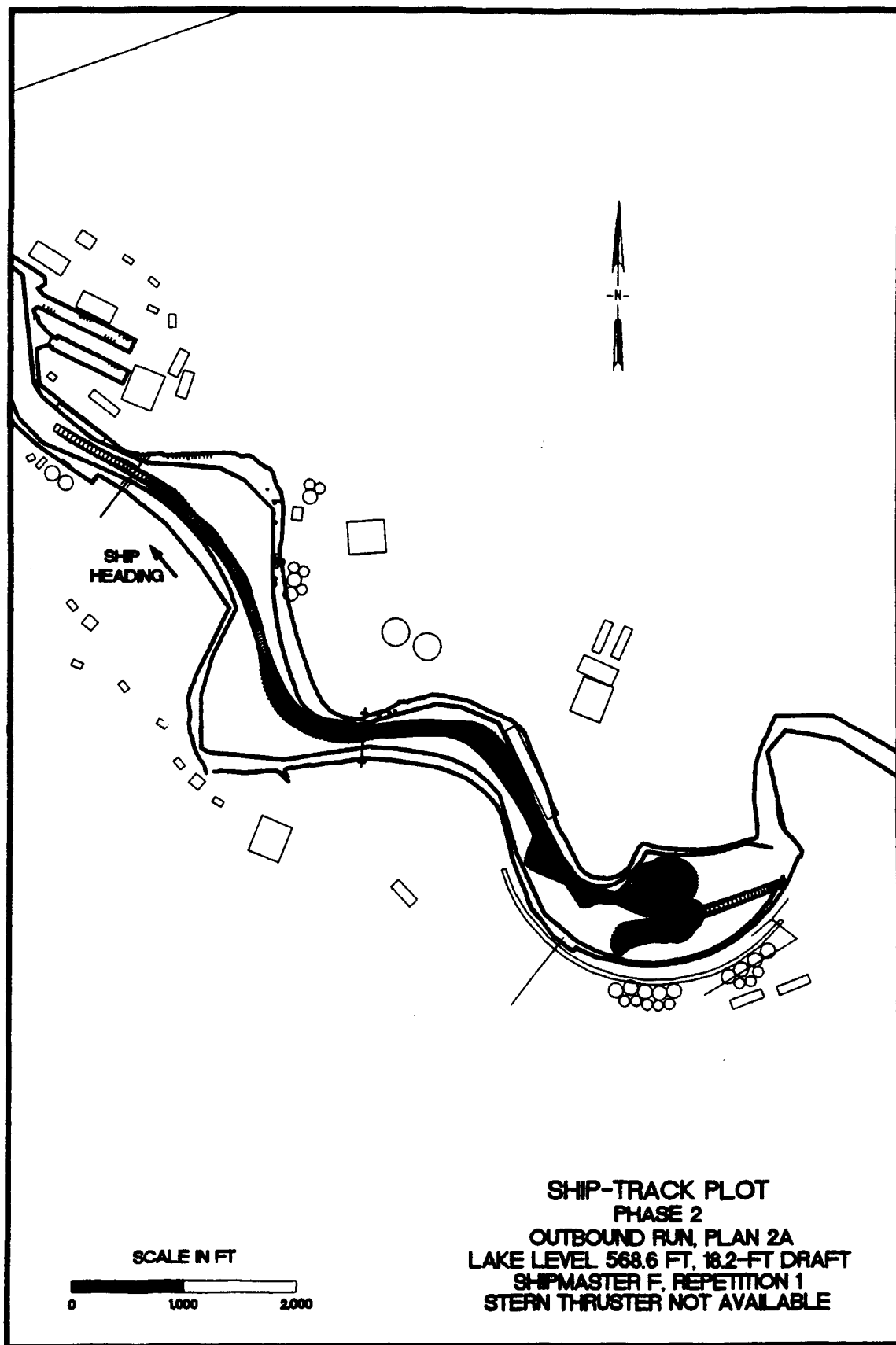


PLATE B126



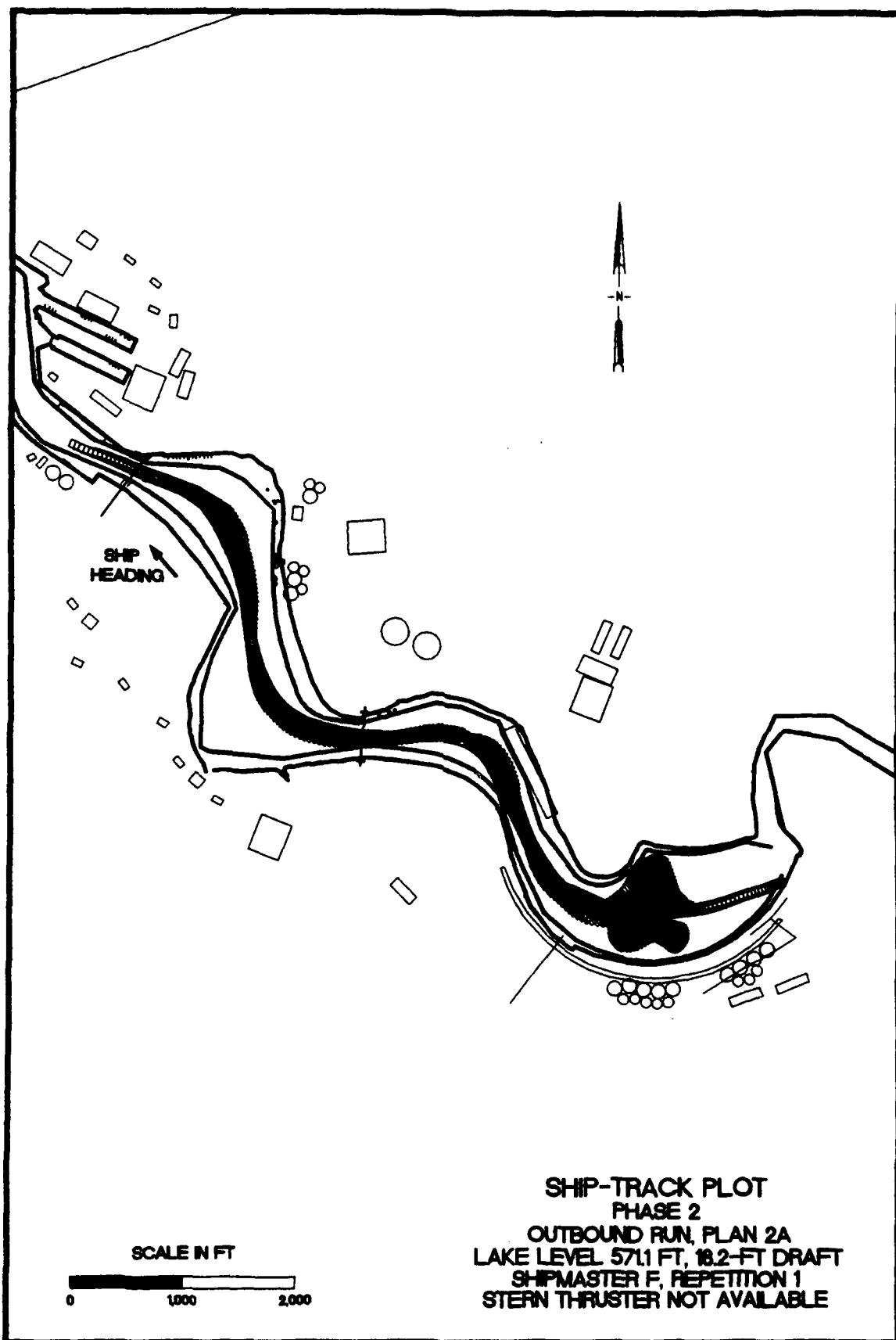


PLATE B128

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